FIRST LOW-COST PENTIUM ALTERNATIVES: DO THEY MEASURE UP?

WINDOWS 95: HANDS-ON TESTS

# PC WORLD

November 1994 $3.95

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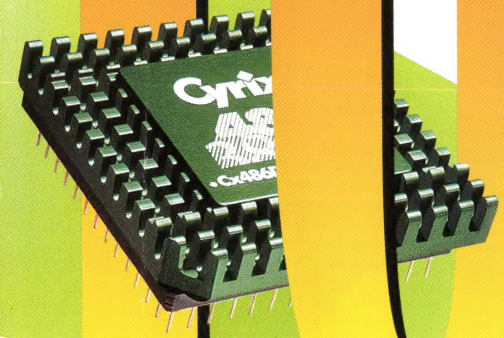

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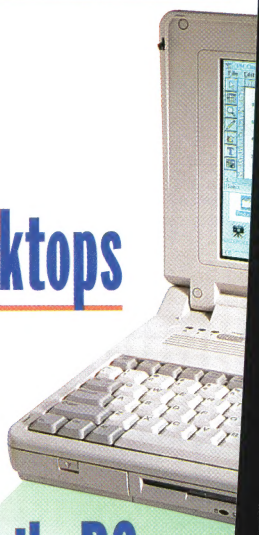

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Winners and Losers: PC Reliability and Service

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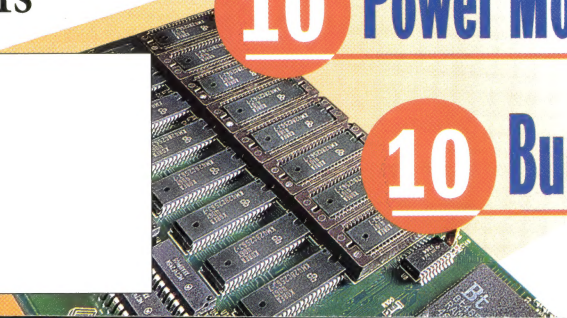

# FROM MICROSOFT OFFICE.

make a link that really works and that's dynamic." And as he works, our exclusive IntelliSense™ technology tracks his progress, then finds ways to make the tougher jobs easier and the easier jobs outright automatic. For instance, Word can correct Matthew's most common typos automatically. It's almost (dare we say?) fun. "Building presentations is 100% easier," Matthew claims. "People at work come in and say, 'What are you using there?' It's amazing. And it's no big deal because it takes no time." So Matthew and his business development presentation, "Nickelodeon 101," are a big smash wherever they go. Just like Microsoft Office. This leading family of business software keeps getting more and more popular. With people like Matthew. And with companies both large and small all over the world. And to make sure it stays that way, we offer the only unlimited support* with no service charge for a product of this kind. So call (800) 240-4782, Department 4GG, for our free Office Information Kit.** With Microsoft Office, you'll see how your business could enjoy a growth spurt of its own.

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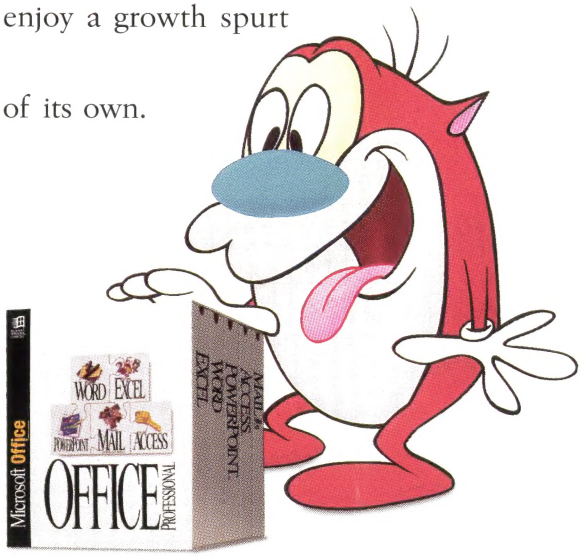


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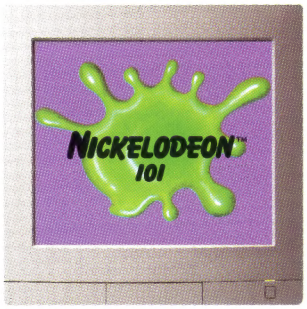
# NICKELODEON HAS BECOME THE BIGGEST KID ON THE BLOCK.

# WITH A LITTLE NURTURING




Ever seen a big glob of Green Slime™ oozing down a kid's face? Then you've seen Nickelodeon® in action. And their business development wizard, Matthew Goldstein (the one wearing pants). His mission is to spread the hip, irreverent, "for kids only" Nickelodeon brand into every new market he can find. From developing Nickelodeon-inspired toys like Green Slime, to spawning international syndication, *Nickelodeon Magazine*, home video and movie deals. That means a lot of meetings for Matthew. A lot of presentations. Naturally he relies on Microsoft® Office to help him put it all together. "Everything is all linked. It's all one. And it just makes life so easy," says Matthew. "It makes an unbelievable difference in my work." We call this phenomenon OfficeLinks. And it means that sharing things like words, numbers and graphics is, well, child's play. Matthew can create an audience demographic chart in Microsoft Excel, then just drag that chart across the screen into his Word report and drop it in. Viola! Instant linkage. Matthew thinks it's incredible. "I love the fact that I can

NICKEL

*Microsoft Office helped Nickelodeon move into over 70 countries.*

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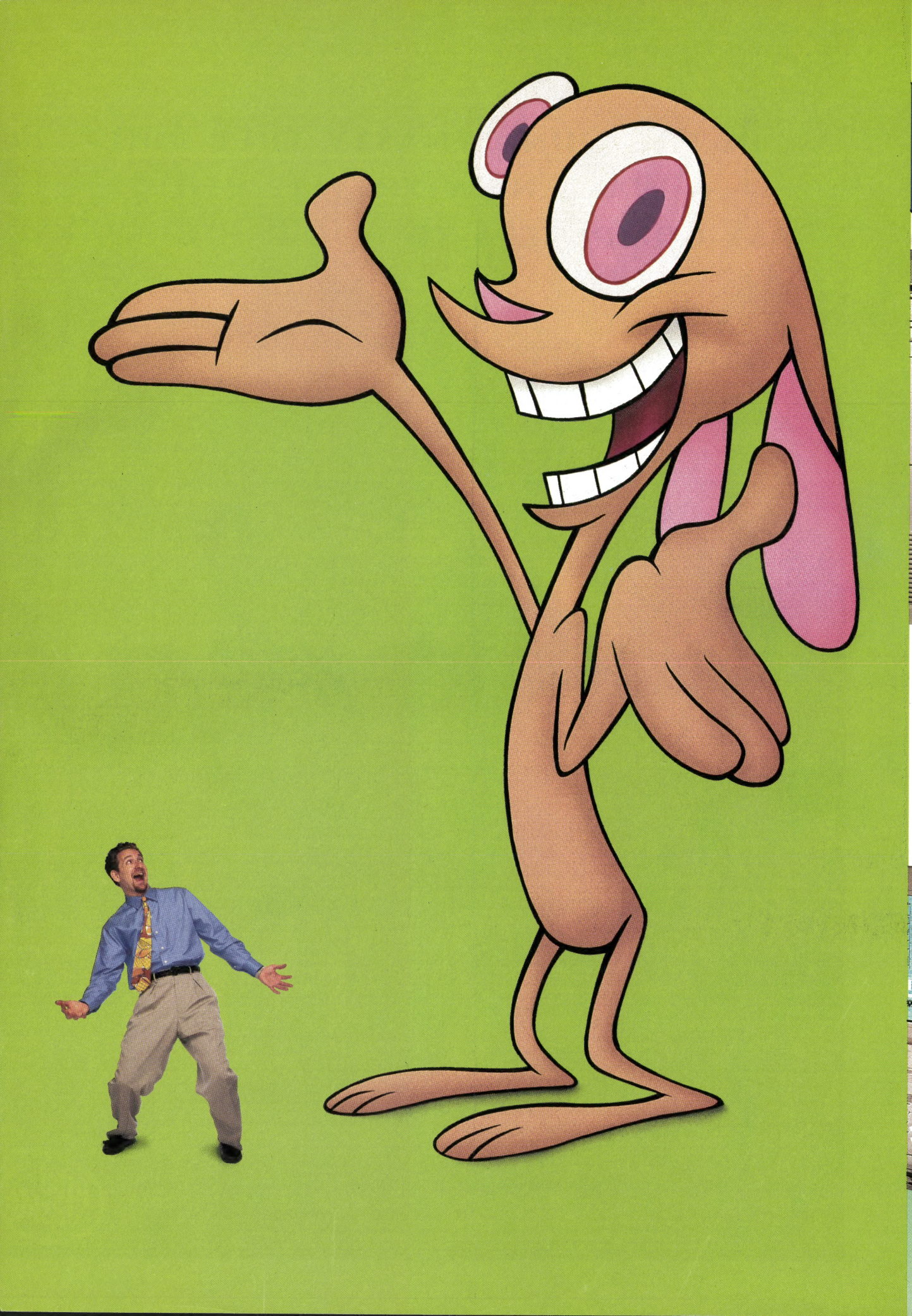

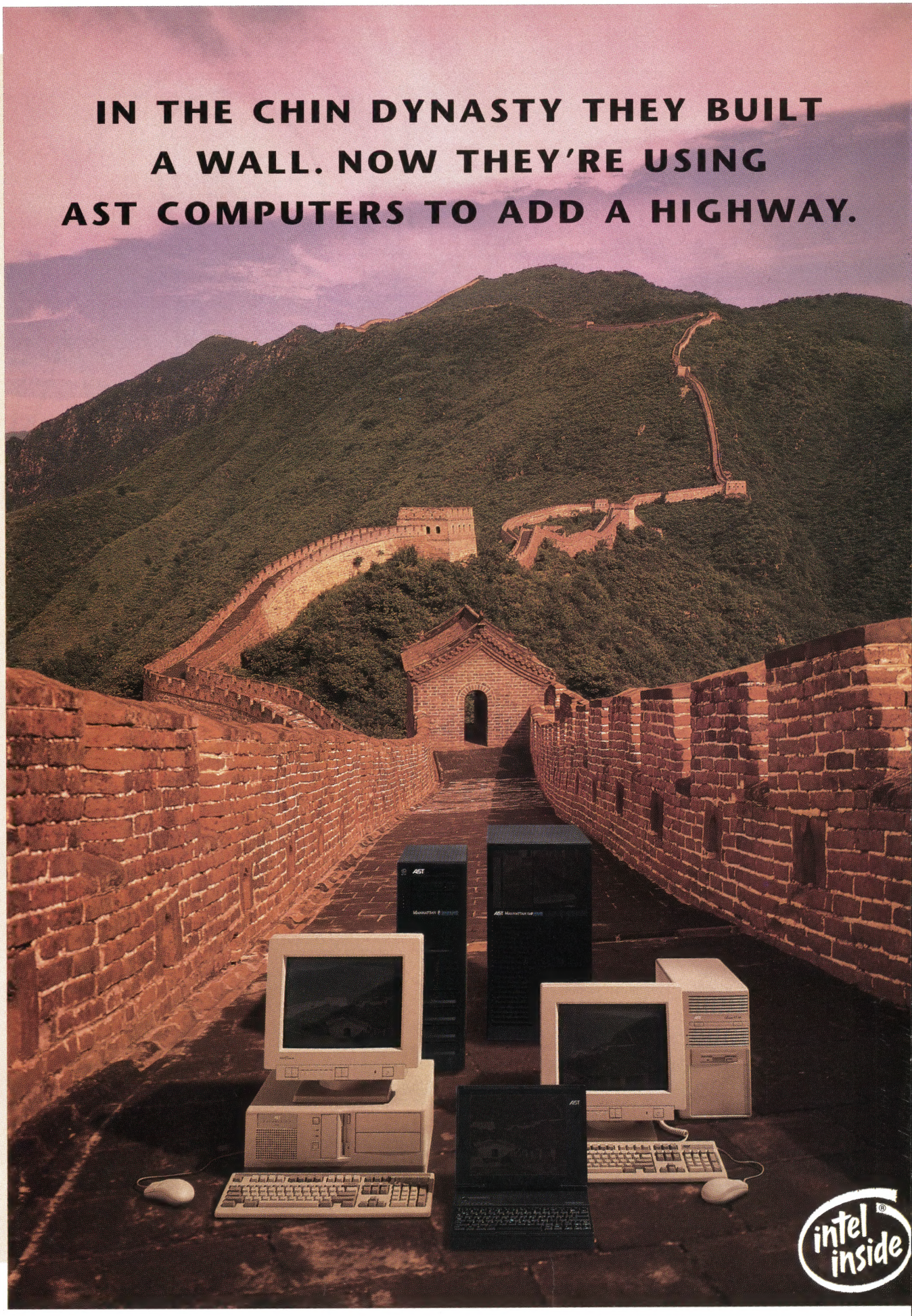
IN THE CHIN DYNASTY THEY BUILT
A WALL. NOW THEY'RE USING
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**Circle 38 on reader service card**

# PC WORLD

## Cover Story


**114 Upgrades: When They're Worth It, and When They're Not**
How do you breathe life into an older machine? By adding RAM? A CPU upgrade? A graphics accelerator? To find the most cost-effective solutions, we tested these tactics and more on PCs from a 386DX-33 to a 486DX2-66 to come up with the ultimate upgrade guide.


## Special Report: Mobile Computing


**241 Screen Tests**
Screen quality is the single most important consideration when buying a mobile PC. We had 47 users evaluate leading active-matrix and passive screens, with revealing results: That pricey, active-matrix notebook might look impressive, but it may not be your optimum road PC.

**252 Pointers in the Right Direction**
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**Cover photography by Robert Cardin, digital composition by TX Unlimited/San Francisco**

## Windows


**138 Second Look: Windows 95**
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## Interfaces


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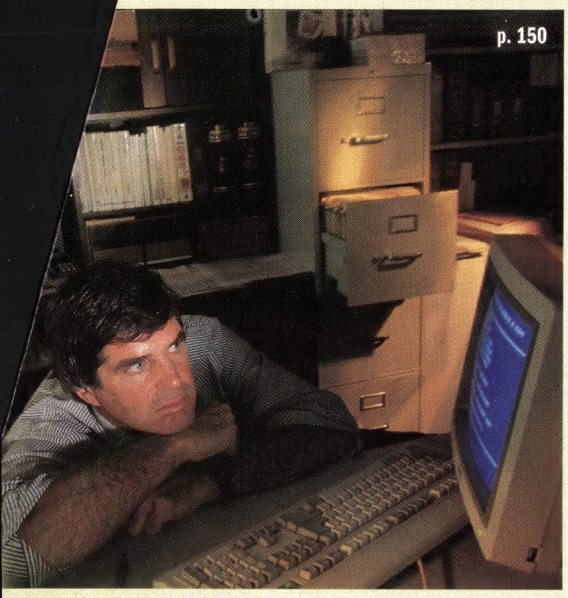
VOLUME 12
NUMBER 11




## Graphics Boards

**235 Top 10 Windows Accelerators: Two Newcomers Excel**
The Hercules Dynamite Power PCI and STB Powergraph Pro PCI join the ranks of our top 10 performers.

## Reliability & Service Monitor

**265 Win a DX4-100 PC**
How satisfied are you with your PC? Have you had any problems with it? Or is it trouble-free? Tell us about it! Fill in and fax this month's survey for a chance to win a Zeos Pantera DX4-100, a Best Buy PC from this month's Top 20 charts and the fastest DX4-100 we've seen.

## Systems

**196 Top 20 PCs: The Shrinking Cost of Computing**
Power has never been cheaper with PCs at bargain prices, including Pentium 90s for $2995 and a DX4-100 PC priced under $2100. We also review blazingly fast Pentium and DX4-100 notebooks. This month's chart toppers: Dell's five-time winner, the XPS P90; Micron's 4100PCI Magnum; and Compaq's Contura Aero 4/33C and LTE Elite.

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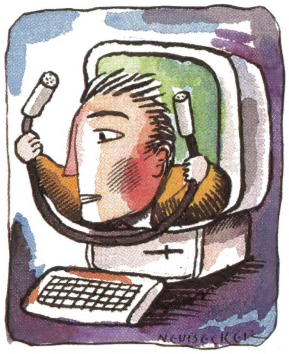

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# The ZEOS® Pantera™... "This Is As Good As It Gets."

## –*PC World* Best Buy, August 1994

It's true! The ZEOS Pantera is as good as it gets. Leading experts from top industry publications all agree that the ZEOS Pantera is the best PC available. Unparalleled in its field, the Pantera has continuously earned award after award–month after month (including two Best Buys from *PC World* in October).

There's no desktop system that comes close to the ZEOS Pantera in performance, reliability, and value. As *PC/Computing* said: "Rocket-fast performance and a great price make this our favorite Pentium of the lot."

### Supreme Power & Performance

The ZEOS Pantera, based on Intel's 486 and Pentium processors, is breaking record after record with its supreme power and awesome performance.

"Mark a new high on the performance chart!" *PC World* said the Pentium-66 and Pentium-90 Pantera PCs were "the fastest system(s) ever tested."

The ZEOS Pantera 66MHz and 90MHz also received the highest scores in all benchmark tests run by *Windows Sources*. "The ZEOS Pantera rose above the crowd and posted the most impressive performance numbers."

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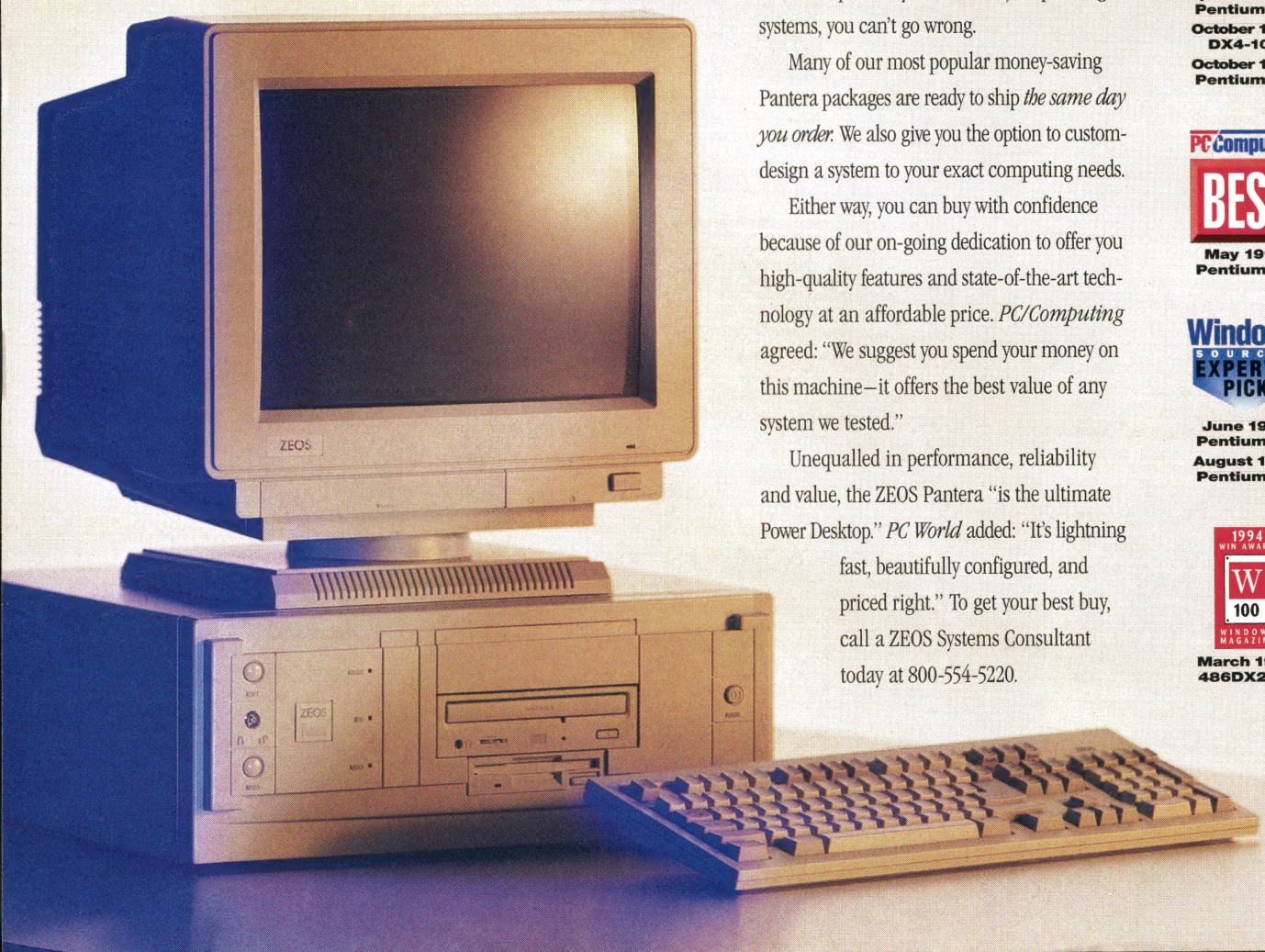
### Valuable Extras

The Pantera is a first-rate example of ZEOS' commitment to provide you with an excellent value on an award-winning machine that will increase your productivity. With all the extras, options, and 100% compatibility with all major operating systems, you can't go wrong.

Many of our most popular money-saving Pantera packages are ready to ship *the same day you order.* We also give you the option to custom-design a system to your exact computing needs.

Either way, you can buy with confidence because of our on-going dedication to offer you high-quality features and state-of-the-art technology at an affordable price. *PC/Computing* agreed: "We suggest you spend your money on this machine–it offers the best value of any system we tested."

Unequalled in performance, reliability and value, the ZEOS Pantera "is the ultimate Power Desktop." *PC World* added: "It's lightning fast, beautifully configured, and priced right." To get your best buy, call a ZEOS Systems Consultant today at 800-554-5220.



April 12, 1
Pentium-
June 28, 19
DX4-100

COMPUTER SHOPPER
April 1994
Pentium-60
August 1994
Pentium-90

PC WORLD BEST BUY
January 1994
486DX2-66
February 1994
486DX2-66
March 1994
486DX2-66
June 1994
486DX2-66
June 1994
Pentium-66
July 1994
Pentium-66
August 1994
Pentium-66
August 1994
Pentium-90
September 1994
Pentium-66
September 1994
Pentium-90
October 1994
DX4-100
October 1994
Pentium-90

PC Computing BEST
May 1994
Pentium-66

Windows SOURCES EXPERTS' PICK
June 1994
Pentium-66
August 1994
Pentium-90

1994 WIN AWARD W 100 WINDOWS MAGAZINE
March 1994
486DX2-66

| Processors | Package 1 | | Package 2 | | Package 3 | | Package 4 | |
|---|---|---|---|---|---|---|---|---|
| 486SX-33 | $1445 | Lease $61/mo. | $1745 | Lease $64/mo. | $2245 | Lease $82/mo. | $2745 | Lease $100/mo. |
| 486DX-33 | $1545 | Lease $57/mo. | $1845 | Lease $68/mo. | $2345 | Lease $86/mo. | $2845 | Lease $104/mo. |
| 486DX2-66 | $1595 | Lease $58/mo. | $1895 | Lease $69/mo. | $2395 | Lease $88/mo. | $2895 | Lease $106/mo. |
| DX4-100 | $1945 | Lease $71/mo. | $2245 | Lease $82/mo. | $2745 | Lease $100/mo. | $3245 | Lease $108/mo. |
| Pentium-60 | $1945 | Lease $71/mo. | $2245 | Lease $82/mo. | $2745 | Lease $100/mo. | $3245 | Lease $108/mo. |
| Pentium-66 | $2095 | Lease $77/mo. | $2395 | Lease $88/mo. | $2895 | Lease $106/mo. | $3395 | Lease $113/mo. |
| Pentium-90 | $2195 | Lease $80/mo. | $2495 | Lease $91/mo. | $2995 | Lease $110/mo. | $3495 | Lease $116/mo. |

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- Six-bay desktop case with two cooling fans
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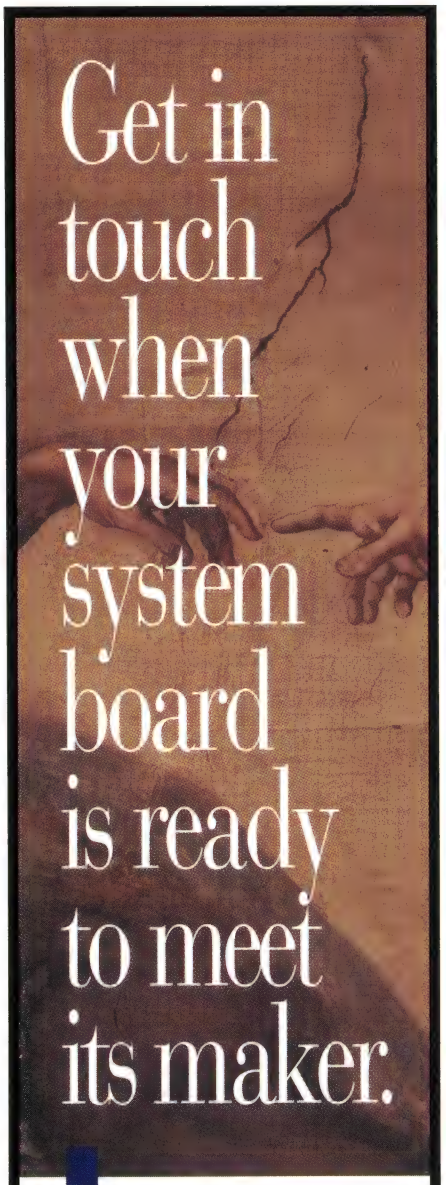


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- Choice of Lotus Windows application

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- 16MB RAM, 256K SRAM cache
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- 2X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64/PCI local bus graphics card with 2MB VRAM
- 14" SVGA color monitor
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Choice of Lotus Windows application

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**Editors' Choice:**
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- 15" SVGA color monitor upgrade
- 10-bay vertical case

**Pentium-66 $3538**
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**Best MM:**
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- 16-bit sound card, stereo speakers
- Diamond Stealth 64/PCI local bus graphics card with 2MB VRAM
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- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Choice of Lotus Windows application

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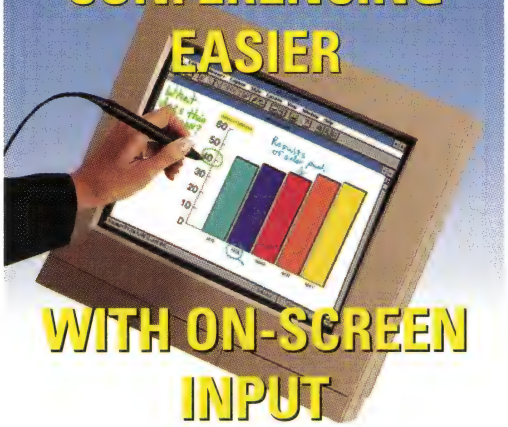

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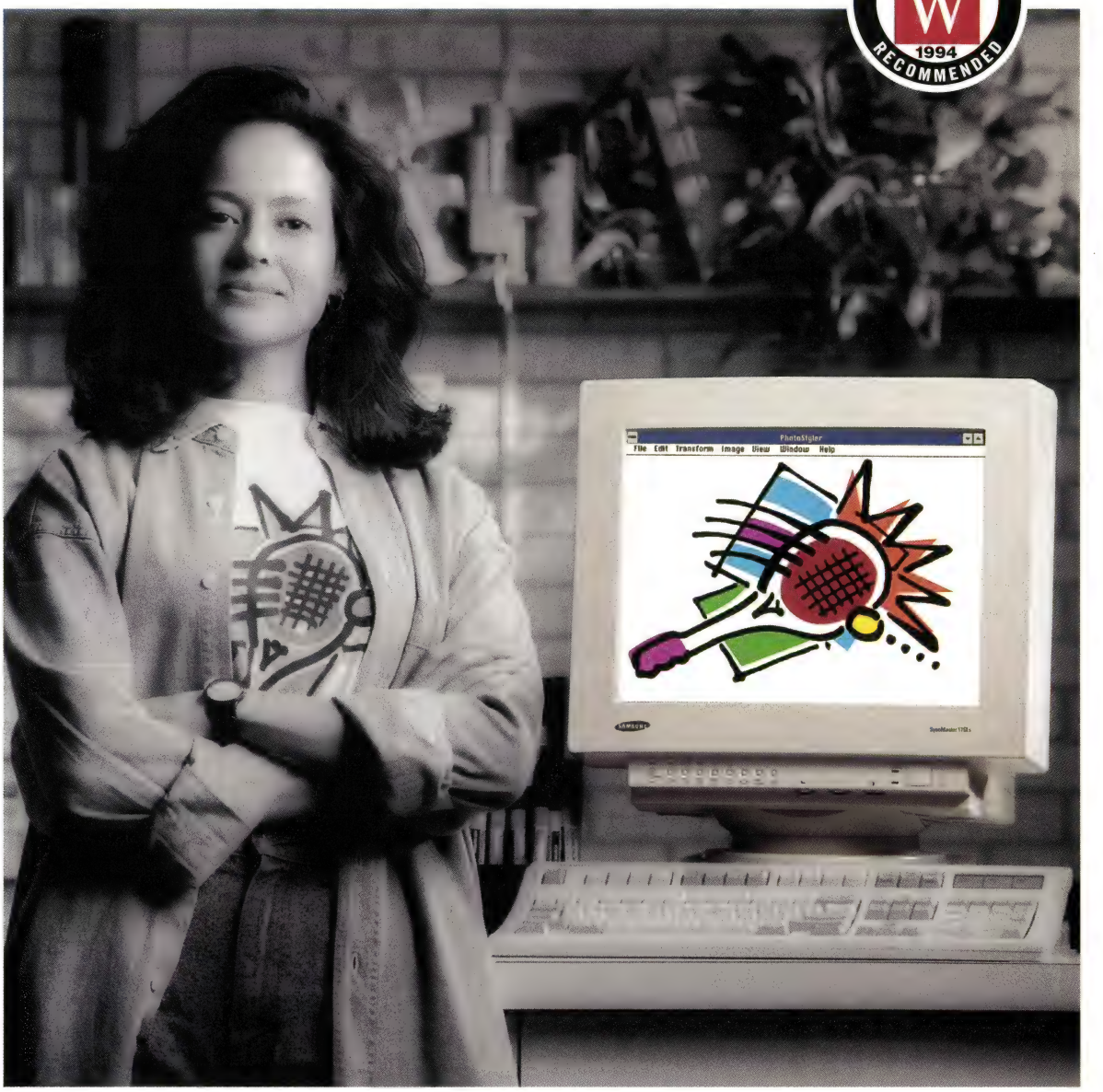


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# 96,000 Readers Rate Their PC Vendors

MICHELE CLEMENT

The last time you bought a car, a CD player, even a coffeemaker, chances are you consulted *Consumer Reports*, the publication of the watchdog organization that tests products and conducts reliability and satisfaction studies on everything from automobile tires to toys.

Conspicuously missing from *Consumer Reports*, though, is information on PC reliability and service. In fact, until recently, consumers were on their own when trying to find out if a specific brand of computer was likely to be problem-free and whether it would be repaired quickly if any problems occurred.

Last June, *PC World* took a giant step toward filling this gap, publishing our first report on PC reliability and service. Based on 45,000 reader responses to our monthly Reliability and Service Monitor, our report rated 21 PC vendors on nine measures.

Your reaction to that report has been overwhelmingly positive. Most of you say the information will be extremely valuable when purchasing your next PC. Most of you find the information on your brand of PC accurate and believable. Most of you want updates at least twice a year.

Our response? This month, you'll find our second report on PC reliability and service—the largest, most comprehensive evaluation ever. Based on replies from 96,000 readers, the report ranks 42 leading PC vendors, which make more than 70 percent of PCs sold in this country.

### High Points, Low Points

A few key findings about PC reliability from our respondents:

- Of the 96,000 PC buyers who returned questionnaires, 53 percent reported no problems with their computer, while 44 percent reported one or more problems.
- Of those who said how many problems they had, 56 percent reported just one problem, and 11 percent reported more than four problems.
- Of those who told us their problem was resolved, 63 percent said it was cleared up in less than a week, and 9 percent said it took more than a month.

When rating the quality of service they received from vendors, here's what respondents said:

- Of those who rated service on a scale from 1 (worst) to 5 (best), 29 percent rated it 1 or 2, while 49 percent rated it 4 or 5.
- Of those who told us how long it took to talk to someone at the company who could help with their problem, 57 percent said they reached someone in less than an hour, while 9 percent said it took more than a week just to talk to someone who could help.
- Of those who told us whether they'd buy the same brand of PC again based on the service and support they received, 65 percent said they would, and the remaining 35 percent said they'd pass.

### Not Commodities Yet

Notice one thing about these numbers: The variations in both reliability and quality of service are huge. So if you think PCs are as alike as boxes of cornflakes, think again. The company you buy your PC from makes a very real difference. Read Senior Editor Roberta Furger and Contributing Editor Daniel Tynan's full report, "For Better or Worse," for details and comparative rankings. And if you buy a new computer—or if you want to report on a computer you've had awhile—please fill out our Reliability and Service Monitor on page 265, and fax it back to us. Only with your help can we become the publication to trust for accurate, unbiased information on which PCs are most—and least—reliable.

### New PCs, Old PCs

Our reliability and service report comes at a particularly appropriate time—Compaq recently announced price cuts as great as 22 percent on its PCs, and IBM responded with a 27 percent cut. At press time, we were waiting for the next salvo in what may become a full-scale preholiday price war, which means bargains. To distinguish the true bargains from the lemons, use our reliability and service ratings and consult this month's Top 20 PC review, "The Shrinking Cost of Computing," for Best Buy recommendations.

**If you think PCs are as alike as boxes of cornflakes, think again. The company you buy your PC from makes a very real difference.**

If you're contemplating a new notebook, also check our special report on mobile computing. We asked 47 typical PC users to tell us which notebook screens were clearest and easiest on their eyes. Contrary to expectations, pricey active-matrix color screens are not always the wisest choice. Heed our advice and you may save several hundred dollars.

Finally, if you're interested instead in wringing better performance from your current 386 or 486 PC, read "Upgrades: When They're Worth It, and When They're Not," and follow the simple 40 percent rule.

Cathryn Baskin

**Cathryn Baskin, Editor**

Utilities Window

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hordes or pilot a jet plane. With the Presario 900 series, you can do it all right out of the box. Even with everything that's on it, there's still plenty of room to grow. You can upgrade the processor (to Pentium technology), the memory (to 100MB) and the hard drive (to more than a gigabyte). You can add up to 128KB of secondary cache. And you can plug whatever it is we may have left out into any of the five available I/O slots and drive bays. It's time, all right. Time to play.

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# Wary About Windows 95, Multimedia Essentials, Net Benefit

### Future Shock

I expect the future of software to be built—win or lose—on Windows 4.0 ["First Look: Windows 4.0," August], and if I want any part of that future, I'll have to jump on the bandwagon.

But not right away.

If 4.0 improves performance and enhances stability and ease of use, why wouldn't I want it? First, I can't afford the investment of 15MB of hard disk space that 4.0 will require.

And I would have preferred a less radical revision. For me, Windows heaven would include a modular upgrade, letting me add as much or as little as I want. Microsoft's decision to implement a proprietary graphical user interface is unacceptable to me. Its withdrawal of support for add-ons such as PC Tools and File Commander is a mistake.

I've spent countless hours turning my machine into a statement as unique as my personality, customizing endlessly so everything runs just so. 4.0 won't support third-party vendors' add-on modules, so upgrading would do away with thousands of hours of my work.

Windows 4.0 will have to offer me a great deal in return before I'm persuaded to upgrade. If I had wanted a Macintosh, I would have bought one.

*Robert E. Butts, South Bend, Indiana*

**Editor's note:** At press time, Microsoft chose the name Windows 95 for the latest version of Windows, reflecting its early 1995 shipping schedule.

### INI Infestation

The feature "First Look: Windows 4.0" doesn't address the one aspect of version 4.0 that keeps me from adopting Windows: the difficulty of eliminating a program and all its files.

Why should a third-party program like Uninstall be necessary to remove extraneous files that Windows programs install when it's so easy to do in DOS? An infestation of unneeded INI files can soon overload even the enormous capacity of new hard drives. If the beta testers could convince Microsoft to include a complete program uninstall, I'd go with Chicago.

*Jerry Tobias, Clifton, New Jersey*

**Editor's note:** As of press time, Microsoft's licensing policy requires developers who want to label their applications "Windows 95–compatible" to include an uninstall capability in those apps.

### Mac Attack

Your Windows 4.0 preview is the best I've read so far, and I've read many. My compliments to Steve Fox on the way he walked us through the program with real-world, everyday tasks. He also helped me realize I'll probably be running DOS 6.2 (with an occasional Windows 3.1 app) for the rest of my life.

Don't get me wrong—32-bit will improve some things. But the more Mac-like PCs get, the less users will be able to do with them. A Mac limits my options to what the programmer gives me. A PC gives me endless options. That's what computing's all about to me.

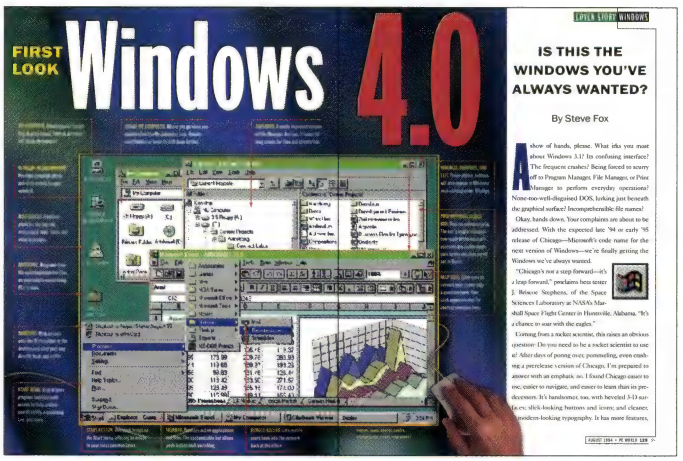
*Darrell Holloway, CompuServe*

### Hardware Is the Easy Part

I've worked with PCs since my Apple II Plus was a high-end desktop, so I have a feel for the industry. And as a partner in a small computer store, I understand the real-world consequences of your recommendations.

"Multimedia, Step by Step" [July] primarily addresses the task of physical installation. The more important and difficult task of configuring the software is mentioned flippantly—"Oh yes—and you have to make all of this stuff work with DOS or Windows"—without offering advice on how to get this done. Assigning conflict-free IRQs is often the least of installation woes.

And the assertion that a user's next drive should be SCSI is presumptuous. Your follow-up article, "Tips From the SCSI Crypt," points out some SCSI pitfalls without even mentioning its expense. SCSI is expensive, complex, and failure-prone. IDE is cheap, simple, and reliable. Which would you bank on?




But even if I'm wrong and the next wave really is SCSI, there's no reason to spend extra money and effort on it today. In the same issue [*Help Line*], you note that "the SoundBlaster's SCSI interface is indeed 16 bits wide—though you hardly need the speed for a peripheral as slow as a CD-ROM drive."

Finally, chances are your readers can buy a multimedia system installed for little more than a kit would cost at a department store or superstore.

*Jason Kottler, Internet*

### Communications Coup

A quick word on *Communications Q&A*. This is just about the best part of your whole magazine. Judy Heim makes the difficult subject of faxes, modems, communications programs, phone devices, and the like easy to comprehend. The tips and ideas I've picked up in this column over the

PHOTOGRAPHY: ROBERT CARDIN (HAND); PIERRE-YVES GOAVEC (BACKGROUND)

years have been godsends to my company. You should have this editor do more!
*Grant Calkins,*
*Westlake Village, California*

### A More Refined Prompt

I thoroughly enjoyed "80 Windows Tips" in the July issue of *PC World*. Tip 32 suggested users add the line 'SET WINPMT= Hey, you're in Windows! $p$g' to AUTOEXEC.BAT, so when they shell out to DOS, the command prompt reminds them they're still in Windows.

As illustrated in your tip, the prompt extends halfway across the screen. The extra-long prompt is not necessary if, as MS-DOS help on the topic suggests, you use **SET WINPMT=Hey, you're in Windows! $_$p$g**, where '$_' represents a return. The resulting prompt would say, 'Hey, you're in Windows! C:\>'.
*Chris P. Slovacek, Lubbock, Texas*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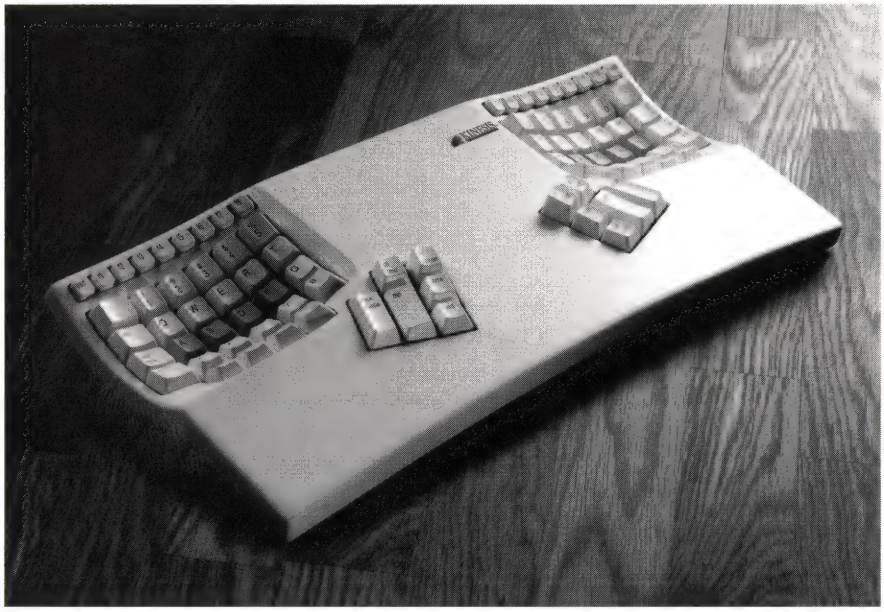

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### No Disks, No Sale

I recently shopped for a PC and found that most computer manufacturers don't ship the software disks along with the PC if its software is preinstalled. Some companies will send you a master CD-ROM for an extra fee, but this helps only if you purchase a multimedia system or a CD-ROM drive.

I don't understand this practice. It can create real problems—for example, what if the PC crashes or is infected with a virus?

My final decision on which computer to purchase came down to which company shipped the disks with the system.
*Steve Hasomeris, Bridgewater, Massachusetts*

### Insider Tip

In July's *Consumer Watch*, Roberta Furger's eighth question is, Who makes the insides? Good question: Many low-cost retailers put anonymous boards in their computers and often can't support them. If you run into trouble, you're out of luck.

I work in the computer support business, and I've run into quite a few of these unidentifiable add-ins, from modems to CD-ROM drives. I always advise buyers to ask who makes the insides of their system and whether those manufacturers' addresses and phone numbers are in the manuals. If the salesperson evades the question, go elsewhere! Or at least be aware that you may be buying unsupported products.
*K. A. Boriskin, Bellingham, Massachusetts*

### Homespun Network

I read with interest "Home Is Where You're Networked" [*Home Office*, August]. When I first considered a small network, I discussed it with my significant other, who has a fancy title on her business card: senior systems engineer. Her suggestion was Novell Lite—with ether-something cards and 10T-whatchamacallits—for its speed, security features, and compatibility with existing hardware.

Did I listen? No. It sounded scary to me. I found a small company in Boise, Idaho, called Apexx Technology. Its WinLAN Instant Networking Kit uses plain old phone connections and wire for cabling. The software is Windows for Workgroups 3.11. It took me about 20 minutes to install the first two cards and get them talking. I installed the add-on version of Windows for Workgroups, and I now have a three-PC net-

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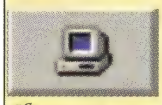

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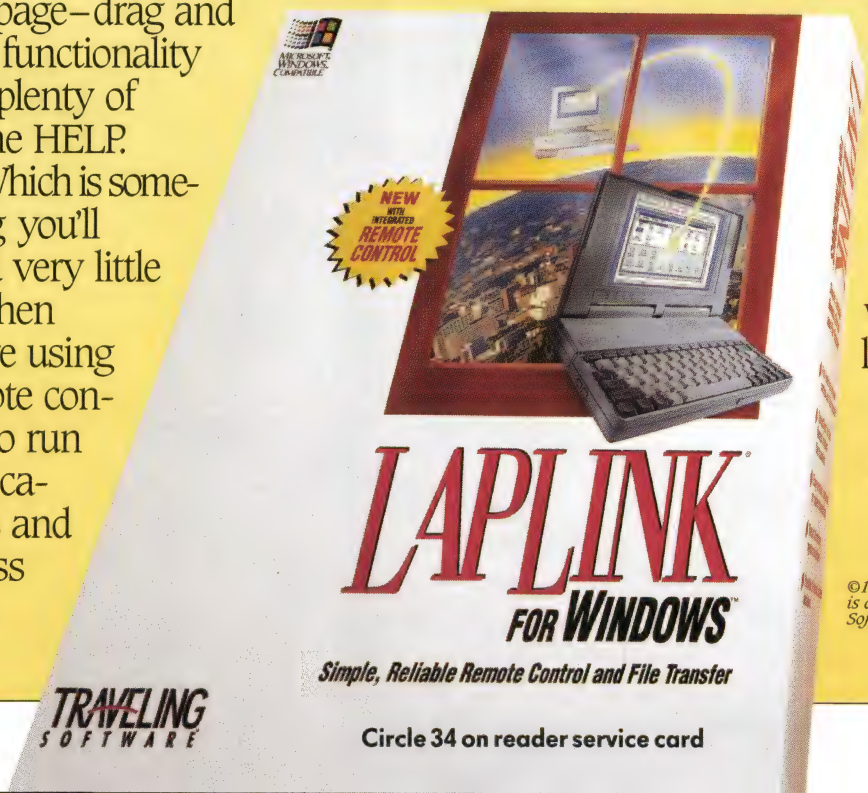


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work. We can send E-mail, do group scheduling, and send faxes from the three workstations—and the price was easy to swallow. Would I use this solution again? You bet.

By the way, perhaps *PC World* should consider renaming *Home Office*. Many of the articles apply to the real world of small business owners and their employees.
*Mitch James, Poulsbo, Washington*

### Reality Bytes

In theory, software on CD-ROM is wonderful: hundreds of commercial programs you can access 24 hours a day, seven days a week, after paying for a password. The problem is, I have three CD-ROMs—all from different companies—each of which requires a TSR ranging in size from 5K to 15K to be loaded into memory. I understand that's how the companies make sure a program doesn't get hacked, but those of us who want to try out more than one piece of software stand to lose 15K to 45K of memory. Many of us just can't spare that much. To add insult to injury, these TSRs must be in memory for any purchased program to work—you can't even remove them once you've bought the program.

If software-on-CD-ROM companies want our support, they need to find a better way. We can't afford to give up that memory.
*John L. Berger, PC World Online*

### Corrections and Clarifications

In "Answering Machine in Your PC" (page 248, September), we listed an incorrect phone number for National Semiconductor. The correct number is 800/272-9959.

"Picking the Right Investment Tool" (page 210, September) stated that Fidelity Investments now handles only Fidelity mutual funds. Fidelity reports that its FundsNetwork lets customers trade more than 1700 mutual funds from 150 fund families.

Our August review "Back It Up!" should have said that Conner makes the Microsolutions backpack 250. Also, Conner is not replacing the Backup Basics software (bundled with the TapeStor 250) with Conner Backup Exec, although Conner says it's improving Backup Basics' capabilities and usability. Backup Exec costs $29.95 and comes with Conner's higher-capacity tape drives.

*Letters welcomes your responses and ideas. See page 12 for contact information.*

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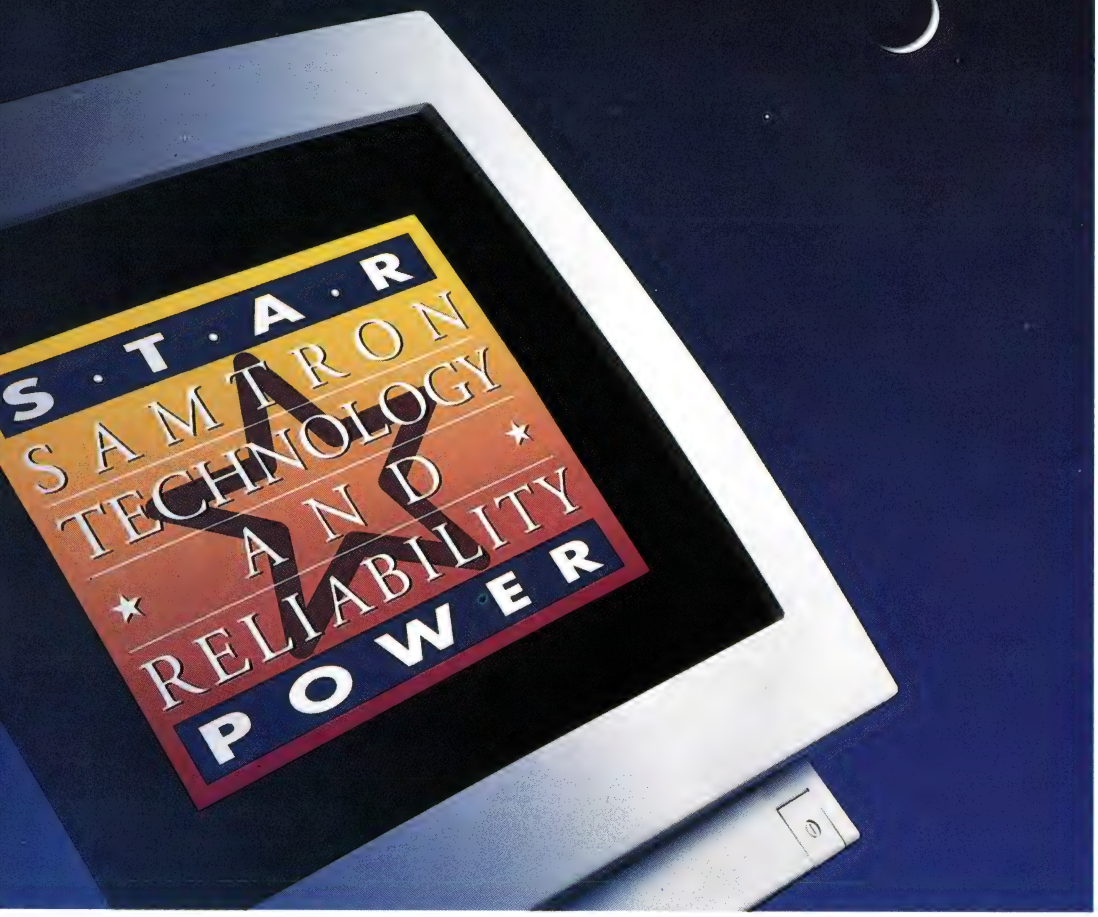

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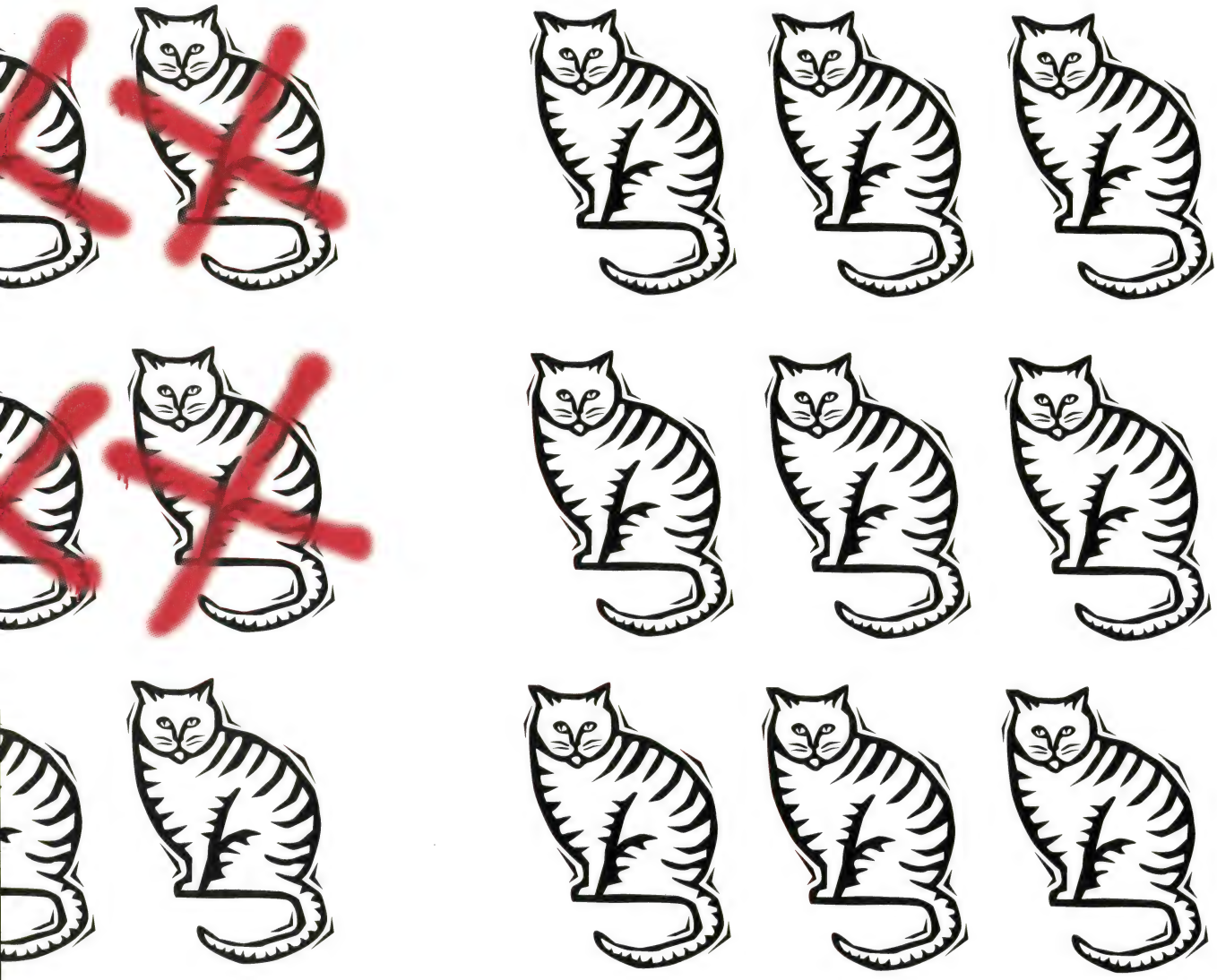

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# Repetitive Strain Injuries: Have You Heard the Wake-Up Call?

Quick, a pop quiz: Have you ever had your workstation evaluated to determine whether your keyboard and monitor are at the right height and your chair fits your body the way it should? Have you ever participated in a training session on safe and comfortable ways to work at the computer?

Chances are, you—or your employer—haven't done either of these things. But you should. Otherwise, you may incur a repetitive strain injury or other physical stress on the job.

PCs are ubiquitous in today's offices, yet only a small percentage of U.S. employers have adopted formal training programs on the ergonomics—the safe and efficient use—of computers.

"Ergonomic training has become a political football," says Neal Taslitz, an attorney and president and CEO of BackCare, a Chicago-based computer resource center. Though many companies know they *should* institute ergonomic training programs for PC users, it's become a "battle of the budgets," says Taslitz, to see which department will pay for it. At a time when layoffs and belt tightening are the norm, no department wants to be responsible for adding to the bottom line.

### Mounting Pressure

Reluctant employers may not have much of a choice anymore. As cases of repetitive strain injury (such as carpal tunnel syndrome) increase among computer users, many people are seeking legal as well as medical help. Lawsuits have been filed against keyboard and PC makers, alleging that they knowingly sold unsafe products, and against workers compensation insurance firms, charging that they failed to give injured workers their due. Employers have also been accused of failing to comply with the Americans with Disabilities Act, which requires that "reasonable accommodation" be made for employees with disabilities, including RSI.

The result, says one ergonomist who has been studying the effects of computer use for nearly a decade, is that lawsuits—or the threat of them—are guiding actions where RSI is concerned. Case in point: Compaq's and Microsoft's announcements of warning labels on all their keyboards. "It's a simple fact of being in this business that we are going to be sued," says Keith Kagley, product manager for Microsoft's new Natural Keyboard (see *Top of the News,* October 1994). Warning labels (and accompanying ergonomic guidelines) won't keep either company from being sued, but they will help the firms defend themselves in court.

These actions, however, do more than provide a blanket of legal protection for Compaq and Microsoft. They also put the onus on employers to make sure their workers are well trained. (For years, Compaq has shipped ergonomic guidelines with its PCs, but they were often lost or discarded during setup, leaving workers to fend for themselves.)

"[The warning labels] throw the ball in the employer's court," says BackCare's Taslitz. "Compaq and Microsoft are telling their customers, 'It's your responsibility to educate and train.' "

### Act Now, or Pay Later

As Microsoft's Kagley and others are quick to note, we are a decade away from knowing the precise cause of repetitive strain injuries among computer workers. Is it keyboards? Ill-fitting workstations? Endless hours at the keyboard without breaks? Stress? How big a factor is body size, or a predilection to certain kinds of injuries?

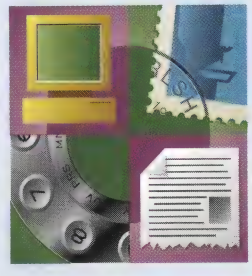
We just don't know.

And until we do, business as usual isn't good enough. PC and keyboard makers are to be applauded for issuing warnings, alerting PC users to potential dangers. Though these actions aren't driven by altruism (one company representative described the current situation as "cover your ass"), they *are* a step in

**by Roberta Furger**

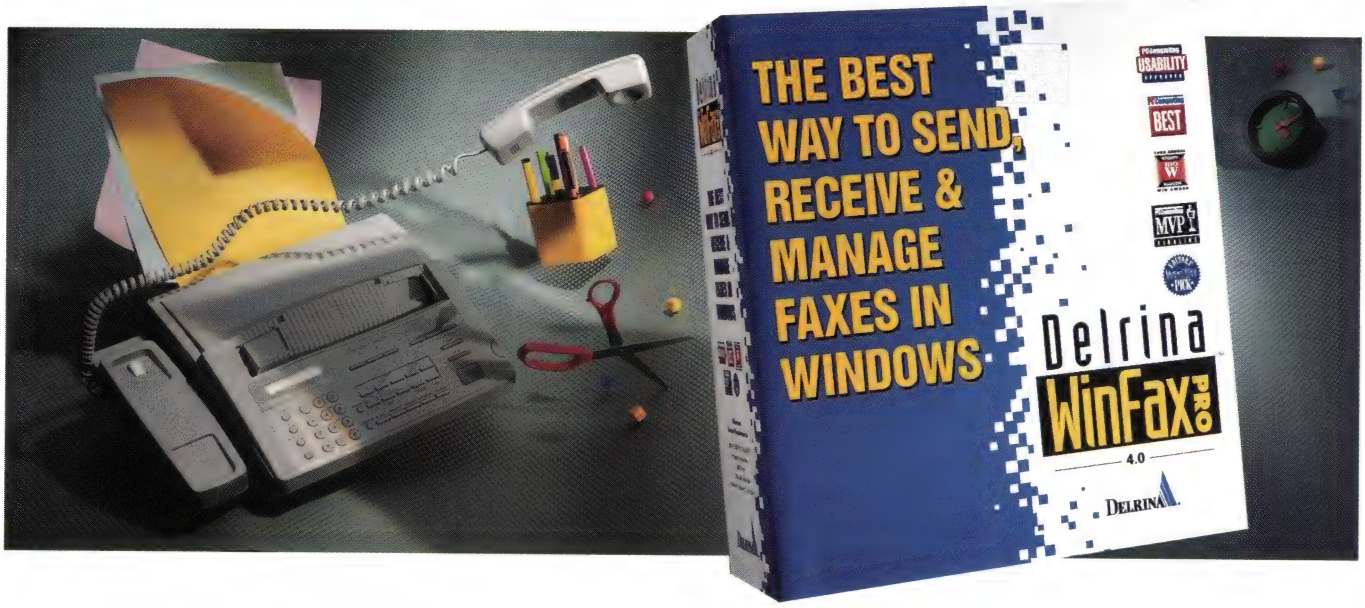
MICHELE CLEMENT

## KEEPING UP



**Help is on the way for Everex customers. Everex, the PC and peripheral maker in Fremont, California, that emerged from Chapter 11 reorganization in 1993, has turned over "end of life" support for many of its products to Electroservice Laboratories of Ventura, California (805/644-2944). Under the agreement, Electroservice will provide tech support, upgrade assistance, and repair services for all Everex hard disks, tape drives, modems, laser printers, monitors, scanners, and controller boards. Everex will continue to support and repair its PCs...A computer in every family room? As part of its aggressive push into the home market, Compaq Computer (800/345-1518) has begun to sell its Presario PCs and Contura notebooks at Sears stores...Tips for going green: Interested in learning more about ways to reduce the environmental impact of PC use? Take a look at *The Green PC: Practical Choices That Make a Difference* by Steven Anzovin ($19.95, Windcrest/McGraw-Hill, 800/822-8158). Now in its second edition, it's a great resource for information about the EPA's Energy Star program, reducing paper use, recycling PCs and components, and more. One chapter discusses environmental information available online.**

# Introducing Delrina WinFax PRO™ 4.0. You'll wonder how you ever faxed without it.



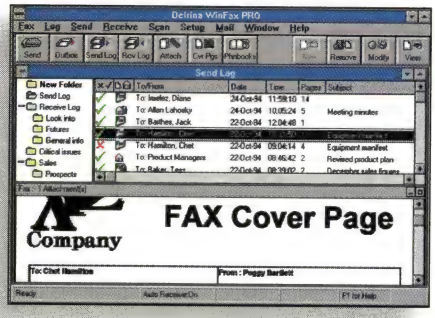

Meet the fastest, easiest, most convenient way ever to handle all your faxing – new Delrina WinFax PRO™ 4.0, the latest version of the best-selling fax software in the world. The only one that combines the advanced faxing features you need with astonishing new ease and usability.

**"The best fax package there is."**

That's what *PC/Computing* said about version 3.0. And now we've made it even better.

Starting with the revolutionary new streamlined interface that makes it simpler than ever to do anything you'd do with a fax machine, and a lot more. Like sending faxes directly from within any Windows application as easily as you'd print. Or organizing sent and received faxes in convenient folders. Or converting faxes into word processing documents with OCR.

There's added convenience with dozens of ready-to-use cover pages. Fax phonebooks that are drag-and-drop simple. And improved fax annotation tools that even let you add your signature.




*Based on extensive usability testing, the new customizable interface includes folders for organizing sent and received faxes.*

**Don't try this with a fax machine.**

Imagine faxing, not just an image of a document, but the actual file itself*, so it's ready to be used in an application. Imagine sending a single document that is automatically faxed to some people and e-mailed to others.

Now imagine you're on the road, and WinFax PRO automatically forwards faxes to you. Or lets you retrieve faxes sent to your regular fax number*. And there's more.

Get new Delrina WinFax PRO 4.0 today and put faxing where it really belongs – on your PC. Call now for information or to upgrade from WinFax PRO or WinFax LITE™. Or see your local dealer to upgrade immediately.

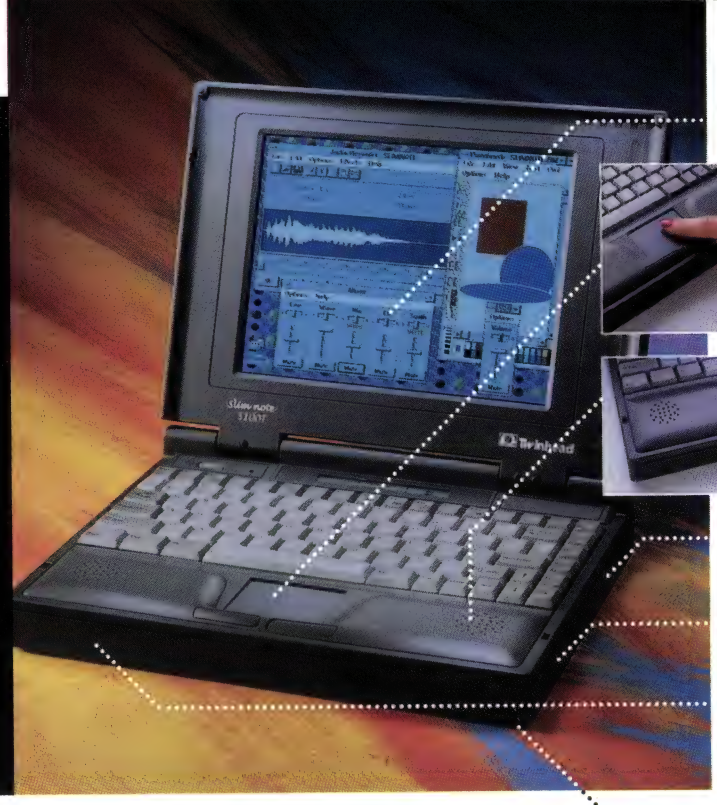
DELRINA
1-800-268-6082

WinFax, WinFax PRO, WinFax LITE and Delrina are trademarks of Delrina (Canada) Corporation. All other product names are trademarks of their respective owners. © 1994 Delrina (Canada) Corporation. All rights reserved.
*Requires Class 1 modem.

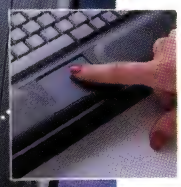
**Circle 99 on reader service card**

INTRODUCING

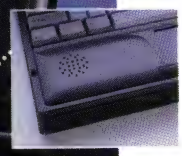
# THE FIRST EXPANDABLE UPGRADEABLE FLEXIBLE AFFORDABLE STEREO MODULAR MULTIMEDIA MACHINE



Two crisp, colorful 9.4" displays to choose from. For an excellent value, get the 256-color Dual Scan (standard with Model 550S). Or for a screen that rivals any desktop monitor, get the TFT Active Matrix (standard with 550T and 5100T).



New TwinTouch™ pointing device, a Slimnote exclusive, is the next step beyond trackballs. Moving the cursor is as easy and intuitive as moving your finger. TwinTouch comes standard on Model 5100 and as an optional upgrade on the 550S and 550T.



Don't settle for tinny 8-bit sound. Slimnote gives you vibrant 16-bit stereo, with two speakers and a microphone built right in. It's the multimedia machine that fits in your briefcase!

The PCMCIA slot, which accepts two Type IIs or one Type III, gives you virtually unlimited expansion.

Get maximum performance from Windows™ with 1 Mb of video on the local bus. Your Slimnote will work beautifully with any VGA monitor, at resolutions up to 1024 x 768.

Want to double your battery life? Simply slide out the floppy-drive module (included with your Slimnote) and replace it with a second battery pack.

You can easily remove the hard-drive module for instant expandability, easy servicing and total data security. Hard drives as large as 500 Mb are available.

Words can hardly begin to describe the Slimnote® 5 Series notebooks from Twinhead. That's because no other notebook offers you so much.

Thanks to its unique modular design, you can quickly customize your Slimnote to fit your needs perfectly. Even if what you need tomorrow is different from what you need today.

Want to add more RAM, a faster CPU, a bigger hard drive, or update your screen? A modem, network card, infra-red or extra battery? You can do it yourself in seconds. Just snap in the module you need and you're ready to go.

For even greater flexibility, the optional Docking Station gives you two ISA slots and one drive bay. And the optional I/O Slice adds SCSI II and MIDI/game ports. It also duplicates all ports on the Slimnote, so you can dock with just a single connection.

**MULTIMEDIA TO GO**

If you make presentations on the road, Slimnote is the ideal notebook for you. You get built-in stereo sound, two speakers, a microphone, 1 Mb of video acceleration, plus your choice of two brilliant color displays. Until now, you needed a desktop machine to get multimedia performance as good as this!

**ORDER DIRECT FROM THE TRUE SOURCE™**

For more than a decade, Twinhead has been building computers for some of the biggest names in the business. Now we're offering our superior quality and reliability direct to you. And when you buy from us, you're protected by our 30 day money-back guarantee, worldwide ExpressCare™ service, and a lifetime of toll-free technical support from the True Source — the people who actually built your computer.

ORDER DIRECT AND SAVE!

**1-800-995-8946**

Monday thru Friday, 8am to 5pm, PDT

PCW1094

**Slimnote 550S. Only $2,479**
IntelDX2/50; 9.4" Dual Scan color display; 4 Mb RAM; 260 Mb hard drive; integrated 25mm trackball.

**Slimnote 550T. Only $3,879**
IntelDX2/50, 9.4" TFT Active Matrix color display; 8 Mb RAM; 340 Mb hard drive; integrated 25mm trackball.

**Slimnote 5100T. Only $4,299**
IntelDX4/100, 9.4" TFT Active Matrix color display; 8 Mb RAM; 340 Mb hard drive; integrated TwinTouch™ pointing device.

Monochrome model available – call for details.

Twinhead® *Two steps ahead*™

intel inside

EXPRESSCARE TWINHEAD

energy EPA POLLUTION PREVENTER

**FREE CARRYING CASE**
Order now and we'll include, at no extra charge, a custom padded carrying case.

**YES!** ☐ Send me the Slimnote 5 Series notebook model I have checked below.

☐ 550S ☐ 550T ☐ 5100T

NAME

ADDRESS

CITY STATE ZIP

Please add $29 shipping and handling. CA and NJ residents please add appropriate sales tax.

METHOD OF PAYMENT:

☐ Check enclosed. **(Payable to Twinhead Corp.)**

☐ Charge to my: ☐ VISA ☐ MasterCard ☐ American Express

CARD NUMBER EXP. DATE

SIGNATURE DAYTIME PHONE

**Twinhead Corporation**
1537 Centre Pointe Drive Milpitas, CA 95035
408-945-0808 Fax 408-945-1080

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**Circle 240 on reader service card**

the right direction. But just a step.

It's time for employers—and their workers—to heed the wake-up call. RSI is serious business. It deserves a serious response.

## Shop Talk

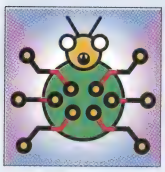
### The Case of the Stolen Phone Number

In April I was given a 386 motherboard that seemed to be working except that it had a problem recognizing the floppy drive. I noticed that the BIOS chip set on this board had a sticker printed with the name Upgrades, Etc. and an 800 number. I called the number and was told I needed an updated BIOS, which would cost me $40. In late May I sent a check for the order.

I waited a normal length of time for shipment, but nothing arrived. When I got my bank statement, I discovered the check had been cashed shortly after I sent it. I wrote the company to inquire about my order.

By the beginning of July I had still not heard or received anything. So I sent the

## BUG WATCH



**Word 6.0a/Windows**

**The UNIDRVR.DLL universal printer driver included with Microsoft Word 6.0a for Windows is no longer compatible with some older HP DeskJet printer drivers. You can download the latest Windows DeskJet driver, 4.1 (contained in the file D5WN31.ZIP) from Hewlett-Packard's CompuServe forum (GO HP). Or call Microsoft product support services (206/462-9673) for an update on disk.**

**If you delete blocks of text by pressing <Backspace> repeatedly, and if the first character of the document is a bookmark, Word for Windows may crash, reporting a General Protection Fault. Microsoft says the problem occurs in versions 2.*x*, 6.0, and 6.0a. It will incorporate a fix into updates of WinWord; for now, you can avoid the problem by deleting selected text with *Edit • Cut* or <Delete>.**

**Windows for Workgroups 3.11**

**If you use a communications program under Windows for Workgroups 3.11 on an early Pentium system (such as Gateway's P5-60 and P5-66 and Dell's Dimension XPS P60), a motherboard design quirk can cause your PC to crash when the software tries to access the serial port. This occurs only if the port uses a 16550 UART chip that has data in its buffer when the app tries to use the port (say, when you're running a second communications program).**

**You can fix the problem with an updated Windows for Workgroups SERIAL.386 driver. Find the driver and its installation instructions in the file WG1001.EXE on CompuServe (GO MICROSOFT) or the Microsoft Download Service (206/936-6735).**

**Compaq PCMCIA-equipped Laptops**

**Compaq has found a bug in the PCMCIA controllers of several of its LTE Elite laptops and is recalling them. The bug causes cards plugged into the PCMCIA slot to stop working or fail to function at all. The problem exists in early production models of the LTE Elite 450/CX Model 340, 475/CX Model 340, and 475/CX Model 510. To find out if your LTE has a problem, call Compaq's customer service (800/345-1518) with your system's serial number. Customer service is on duty weekdays 7 a.m. to 10 p.m. Central Standard Time; weekends, 7 a.m. to 7 p.m.**

**If your LTE Elite is included in the recall, Compaq will ship you a prepaid container by overnight courier. The carrier will come for the box the next day, and Compaq promises to return the repaired system to you within 7 days. You may not have to endure the week of separation, though: Compaq detected and repaired the defect on many LTEs before shipment. These systems have a small orange sticker on the face of the PCMCIA slot. To confirm that your orange-stickered model isn't defective, call Compaq tech support (800/652-6672), open 24 hours, 7 days a week.**

**—Scott Spanbauer**

***Have you run into a software bug or hardware incompatibility? Call us at 415/978-3253 with the details. We'll investigate problems and report on those with the broadest interest. Due to the volume of queries, we may not be able to return your call and can't provide tech support.***

***Scott Spanbauer is a contributing editor for* PC World.**

**Until now, this is how many fax machines you'd need to send 24 faxes simultaneously. Today you don't need any.**

New Delrina Fax Broadcast™ lets you use your Windows PC to send a fax at the same time to a handful of people, or to thousands with a single call. Simply compose your document, then use Delrina WinFax™ 4.0 to make a list of recipients, then send the fax — just once — via fax modem for broadcast over the MCI network. We'll take care of the rest. Call now for $50 of free faxing!*

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FAX BROADCAST
1-800-563-0026

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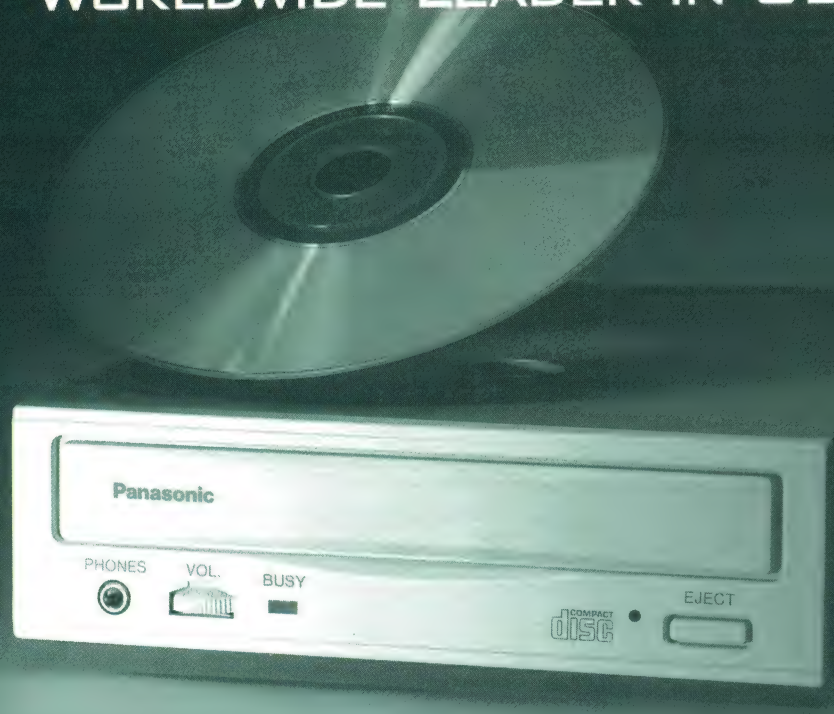
**Circle 146 on reader service card**

# It Takes Incredible Drive to be the Worldwide Leader in CD-ROM Drives*.




LK-MC579BP Enhanced IDE Interface CD • ROM Drive

LK-MC509S SCSI Interface CD • ROM Drive

## Presenting the Panasonic LK-MC579BP Internal and LK-MC509S External Mount CD-ROM Drives.

Whether you're connecting to a PC or a Macintosh, Panasonic has your drive, with the features, support and reliability that have made these CD-ROM drives the benchmark for quality and performance.

Both internal and external mount drive kits feature everything you would expect from the worldwide leader, like high-speed access, support for most major CD-ROM formats, and simple, step-by-step instructions. And to make sure you're up and playing in minutes, Panasonic CD-ROM drives offer industry-leading 24-hour, 7-day technical support and the added peace of mind of a two-year limited warranty (See your dealer for details).

Toll-Free 24-Hour/7-Day Technical Support
2-Year Limited Warranty

It's no wonder there are more of these CD-ROM drives in use today than any other manufacturers, worldwide.

For more information about Panasonic CD-ROM Drives, see your authorized Panasonic dealer for a test drive or call 1-800-742-8086.

CD-PCD

**Panasonic**

From the Worldwide Leader in CD-ROM Drives.

Circle 202 on reader service card

*Source: Dataquest (June 1994)

company a certified letter, which the post office returned to me.

At this point I am not really interested in getting the new BIOS—I found another way to get the motherboard working. What I would like is a refund of my $40.
*Mark Lees, San Francisco*

**Editor's note:** We forwarded Lees's letter to Upgrades, Etc. (also known as TTi Technologies), certain this was an oversight. We were surprised when Marcus Thuna, the company's vice president, promptly wrote back to tell an odd tale of deception. According to Thuna, two years ago his company dropped an 800 phone number it had been using. SmartMicro Technologies, a BIOS distributor in Westlake Village, California, immediately retrieved the number, "hoping to get our repeat business...by claiming to be Upgrades, Etc." The ruse didn't last long, though. SmartMicro folded soon after it opened. "I believe that the experience your reader is describing is definitely not an isolated instance," says Thuna.

Lees confirmed that the number he called was the one Upgrades, Etc. dropped. He also mentioned that when he placed his phone order he was asked to make the check out to "ROM BIOS/Andrew Rothman." Rothman was vice president of SmartMicro. Since SmartMicro's 800 number is now disconnected and its offices are empty, it's unlikely Lees will retrieve his $40. We tried through several sources to locate Rothman for comment but were unable to find him. We always advise readers to pay with a credit card when ordering over the phone, but it's rare to encounter such a glaring example of why.

### Not What I Had Hoped

In May I received an upgrade offer from Corel. Based on the promised new features of CorelDraw and of Ventura (which is included in the new CorelDraw 5.0), I decided to upgrade from my current versions of both packages.

The package arrived from Corel, but Ventura was nowhere to be found. I called Corel's technical support and explained that I had deleted my CorelDraw 4.0 and Ventura 4.2 directories prior to installing the new versions. All they could say was that I should reinstall Ventura 4.2.

Customers get only one free call these days to Corel's support, and I just used up mine to find out Corel shipped the program without Ventura because it wasn't ready.
*Raymond Watkins, Rye Brook, New York*

**Editor's note:** Fiona Rochester, a spokesperson for Corel, told us that the Ventura software was indeed not ready when the company was scheduled to ship CorelDraw 5.0, which is updated annually. So Corel held the program back to complete development and beta tests. "We have been rigorous in delivering upgrades on a release schedule, and we are often called to account for this," she noted. Given the torrent of bug-ridden software (for which CorelDraw users criticized the company last year), many users may find the delay a welcome change. Corel plans to ship the Ventura upgrade to registered users when it is available—probably by the time you read this.

Because of the potential for crippling bugs—or just plain problems—in new software versions, it's always a good idea to hold onto your old version, install the new software in another directory, and see how it works *before* committing yourself (and your work) to the new version.

As it turns out, Corel did not debit Watkins for his call; he still has one free support call available. Whenever you contact tech support about a bug or something you feel is the fault of the vendor, speak up. You shouldn't be charged for that call.

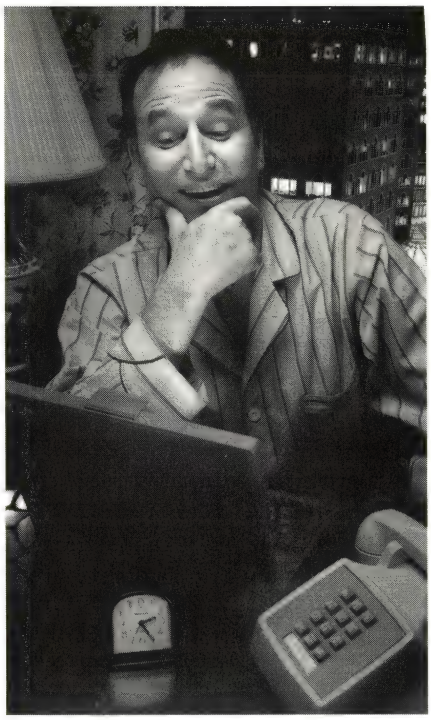
Corel is currently redesigning its fee-based technical support program. *PC World* will report the details as they become available.

### A Rebate Without a Purchase

Broderbund's Print Shop Deluxe box says "$15 rebate for owners of Print Shop Deluxe products—offer inside." But just try to get the rebate.

Broderbund includes a rebate coupon in the box, but that's not enough to get your $15 back. You must include some type of proof of purchase clipped from the manual. I searched the manual but could not find what the company was asking for. Broderbund also wanted a copy of my receipt. But when I tried to make a copy, it wasn't readable. I wrote to Broderbund, explaining the situation, but my lament fell on deaf ears. The company sent me a card saying I had not provided valid proof of purchase.

Broderbund has made the $15 rebate so difficult to obtain that I believe it is deceiv-

**You can't sleep. You can't call room service. At least now you can get all your faxes.**

Now you can get all your faxes whenever and wherever you travel. When someone wants to send you a fax, they simply send it to your Delrina Fax MailBox™ — using your own personal 800 fax number which we provide.

To instantly retrieve faxes with a PC or laptop simply use Delrina WinFax PRO™ 4.0 and a fax modem. Or just call your 800 number and enter your password to receive them via fax machine. If you have a pager, we'll notify you the instant you get a fax. Order today and get one free month, plus ten free pages!*

DELRINA®
FAX MAILBOX
1-800-563-0043

*Customer must call Delrina to discontinue service prior to end of trial period. © 1994 Delrina Fax MailBox and Delrina Communication Services are trademarks of Delrina (Seattle) Corp. WinFax PRO is a trademark and Delrina is a registered trademark of Delrina (Canada) Corp.

**Circle 37 on reader service card**

COMPAQ RACK-MOUNTED PROLIANT SERVERS

# Thousands Of Companies Depend On Microsoft To Run Their Businesses. Did You Ever Wonder Who Microsoft Depends On To Run Theirs?

As one of the largest developers of software in the world, with hundreds of thousands of customers around the globe, there's just one thing about Microsoft that people sometimes overlook: That they've got a business to run, too.

A business with people who need constant (and instant) access to crucial information–like customer service records and problem/solution databases. And a Microsoft® Windows NT™ Server network that not only serves their headquarters near Seattle but all of their offices around the world. So they need to have server systems they can count on.

Which is why they rely on Compaq.

Because Compaq provides reliable servers that keep running. Servers that allow you to configure Microsoft Windows NT Server simply and easily with one CD. And Compaq has servers that come with Insight Manager, which is a specially designed Compaq technology that manages over 800 key server elements and warns you about potential problems. Before they become real ones.

And because they're Compaq servers, each one is backed by our three-year on-site warranty* and our 7 day a week, 24-hour technical support line.

So if you're looking for a powerful and reliable system to help you run your business, give us a call at 1-800-664-9888. But do yourself a favor, don't just take our word for it. Ask around.

COMPAQ

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**Circle 83 on reader service card**

# THE NEW MULTISYNC® XE SERIES. THE ONLY THING IT BLURS IS THAT FINE LINE BETWEEN WORK AND PLAY.

Three years ago, we embarked on a mission. To build a monitor that was so clear, so brilliant, so easy to control it would make your work more enjoyable.

The result? NEC is proud to introduce the MultiSync XE Series of monitors.

They feature superior screen performance that makes everything you're working on crystal-clear. And they're easy to work with. Our On-Screen Manager (OSM™) offers you on-screen controls with animated icons. You're in control of practically all monitor functions, from screen geometry and image size to color temperature. The first monitors to be compatible with the new Microsoft® Plug and Play standard, they eliminate configuration headaches while automatically optimizing the monitor's performance*.

**MultiSync XE Series**

Flat square CRT, Plug and Play, Digital On-Screen Controls, AccuColor,® Energy Star, MPR-II, NUTEK, Compatible with PC and Mac systems

**XE15**
15" CRT, 13.8" viewable image size
Max Res: 1024 x 768 NI @ 76 HZ

**XE17**
17" CRT, 15.6" viewable image size
Max Res: 1024 x 768 NI @ 76 HZ

**XE21**
21" CRT, 19.8" viewable image size
Max Res:1280 x 1024 NI @ 60 HZ

NEC offers integrated accessories for enhancing X Series monitors including AudioTower speakers and Monitor Lens.

Our MonitorManager™ software allows you to switch resolutions (for Macintosh®), utilize power management, and control color.

They're all backed by a three-year limited warranty. More importantly, they're backed by our reputation for building the finest computer monitors in the world.

Call 1-800-NEC-INFO for details.

Call 1-800-366-0476 for information sent via fax. Ask for our document 9301.

**SEE, HEAR AND FEEL THE DIFFERENCE.™**

NEC

*When used with Plug and Play compatible hardware and Microsoft Windows™ 4.X.

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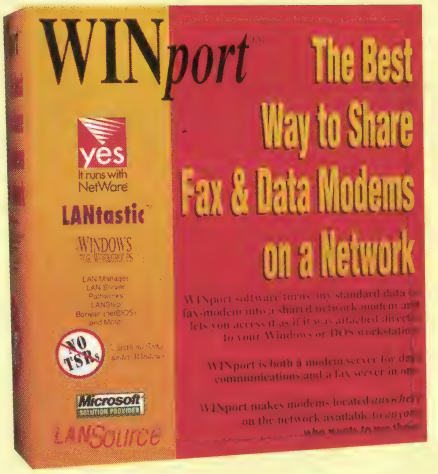
Circle 203 on reader service card

SYNTHETEX
SYNTHETEX
Laboratory scientists at
SYNTHETEX have developed what they
believe is the world's strongest fiber. The fiber
gets its strength from a process that restructures
Bilateral Stress – Polymer Reaction
1.005 0.452
1.502 0.517
2.006 0.097
2.507 0.065
3.252 1.344
3.788 1.782
4.013 1.979
4.507 2.036
5.780 2.370
6.905 3.012
NEC
MultiSync XE17

- No more line-ups at the fax machine
- Reduce your communications costs
- Inbound/outbound fax and data
- Easy installation
- Let unlimited users share a network modem for the cost of a modem ($299 for a one modem license)




## ...and Data as Well!

NO TSRs "...with no TSRs under Windows!"

If you have fax or data modems on your network, then WINport will let network users share those modems. WINport is so versatile it works with any Windows communications or fax software "right out of the box" including WinFax Pro, pcAnywhere, WinCIM, Procomm and more.

*"It has some nice features in the fax management... it runs in real-time so I can see the faxing in progress and have more control."*

L Pukhovitsky
Charm Sciences Inc.

*"If you're considering installing Winfax Pro for Networks, consider this option first."* S. Rodda
Personal Computer World - 04/94

Includes FAXport, for store and forward faxing, out-bound network fax queuing & scheduling, and inbound fax routing.

*"I would recommend this package to many clients and I have already done so."* S. Rodda, Personal Computer World - 04/94

Includes ViaFAX for Windows - unlimited users. Call today for the name of a distributor or reseller near you to put your modems on the network map!

yes It runs with NetWare

**LANSource Tel: (800) 677-2727 (North America) Fax: (416) 535-6225**

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**Circle 223 on reader service card**


**Editor's note:** A spokesperson for Broderbund told us the rebate offer was intended for customers who had already purchased previous versions of Print Shop Deluxe—and that was the proof of purchase the company was looking for. Despite the misunderstanding, Broderbund issued Millar the $15 rebate.

### A Pleasant Taxi Experience

I would like to give credit to a company that impressed me with its great product and excellent technical support. The company is Middlegate, the maker of Taxi.

I received my first copy of Taxi (a navigational mapping program) through a promotional offer when I purchased an ACT 2.0 for Windows upgrade from Symantec. This was just the core version of Taxi, which covered only Chicago and New York.

I had trouble getting the program to load on my Packard Bell Statesman laptop (a problem that I've had with other Windows software on this machine), so I called Middlegate at 800/439-8294. I was told that I was the second user to experience this problem on the same system. The technician suggested that I install the software on a different system and copy the files from my desktop to the laptop. This technique worked fine.

The following day I called Middlegate to order the $39 Chicago metroplex floppy disk (which includes the city's surrounding suburbs). But the sales clerk said he could sell me the CD-ROM version of Taxi (which includes the metro and suburban areas of five major cities) for the same price—only $39. I placed my order and received the CD-ROM within a couple of days. The clerk also told me the technician I spoke with earlier had called Packard Bell, and he gave me the name of a Packard Bell engineer who would call me later.

Finally, when I mailed in my registration card Middlegate sent me a CD-ROM with a sixth city added—for free!

I hope we see more great products from this company in the future. Whatever they are, I will buy them.

*John S. Pindelski, Orland Park, Illinois*

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## *OAG® FlightDisk® 3.0* is here. Take advantage of our limited time offer!

The OAG North American FlightDisk provides you with easy and efficient flight planning to and from anywhere in North America.

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*Does not include shipping and handling.
*LAN pricing based on a 15 unique user license.

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**Circle 104 on reader service card**

# Save Disk Space

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PC WORLD WORLD CLASS AWARD

PKWARE® introduces the next generation of its award winning compression utility. PKZIP 2.0 yields greater performance levels than achieved with previous releases of the software. PKZIP compresses and archives files. This saves disk space and reduces file transfer time.

Software developers! You can significantly reduce product duplication costs by decreasing the number of disks required to distribute your applications. Call for Distribution License information.

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Software developers! Save disk space and media costs with smaller executables. You can distribute your software in a compressed form with PKLITE Professional.™ PKLITE Professional gives you the ability to compress files so that they cannot be expanded by PKLITE.™ This discourages reverse engineering of your programs.

PKLITE increases your valuable disk space by compressing DOS executable (.EXE and .COM) files by an average of 45%. The operation of PKLITE is transparent, all you will notice is more available disk space!

## Compression for YOUR Application

The PKWARE Data Compression Library™ allows you to incorporate data compression technology into your software applications. The application program controls all the input and output of data, allowing data to be compressed or extracted to or from any device or area of memory.

All Purpose Data Compression Algorithm compresses ASCII or binary data quickly. The routines can be used with many popular DOS languages. A Windows DLL and an OS/2 32-bit version is also available!

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The Data Compression Experts

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PKZIP $47.00 PKLITE $46.00 PKLITE Professional $146.00
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Wisconsin residents add appropriate state sales tax & county sales tax.
Visa and Mastercard accepted, no COD orders.

Comdex Booth #S374 PCW11/94

Circle 212 on reader service card


### Where Has TimeWorks Gone?

I purchased Translate It for Windows (a program that translates between English and French) on July 15th from a local electronics store. A week later I wanted to contact technical support. That's when I realized I had a problem.

I tried for one month to reach someone at Timeworks International, to no avail. I left a message on America Online and then discovered that Timeworks had gone out of business. I guess I am stuck with a program that has no support. I also ordered the free dictionary, and of course, I have not received that either.

*Diran Chilingirian, Mastic Beach, New York*

**Editor's note:** Timeworks International, publisher of the Publish It line of desktop publishers, Translate It, some database products, and other software, is no more. As this article went to press, the company had not officially filed for bankruptcy, but the phones go unanswered and the building has been vacated. An ex-employee of the firm told *Consumer Watch* that the close was sudden and that employees lost wages and expenses owed to them.

Fortunately for users of Publish It, GST Software Products, original developers of the desktop publishing program, has announced plans to support the Windows and DOS versions of the product. Technical support is available by calling 612/544-4890, or by sending a question to the firm's CompuServe account (7135,332, or, for Internet users, 71351.332@compuserve.com). Customers can also write to GST at P.O. Box 26204, Minneapolis, MN 55426. When writing GST, include information on how you can be reached, as well as what version number of Publish It you are using.

Users of any version of Publish It can upgrade to GST's Pressworks version 1.03 for $29 (800/236-1062). Publish It was developed by GST Software Products, and Pressworks 1.03 is equivalent to version 4.0 of Publish It.

*Shop Talk is written and researched by PC World Associate Editor Christina Wood with research assistance from Peggy Nauts. Think you've gotten a raw deal—or a great one? Consumer Watch wants to hear the details. We'll investigate complaints and publish letters with the broadest interest. See page 12 for contact information.*

All He Does Anymore Is Tie Me Up In The Backyard...
Dr. K. Ni

Microsoft ACCESS
MONEY
Microsoft EXCEL
POWERPOINT
Microsoft Office
POWERPOINT

*You see... it's like this Doc... Gateway 2000® is man's new best friend. I used to think I was top dog.* I was so much happier before his Gateway 2000 P5-90XL became a bone of contention between us. Walks, roughhousing — we even watched the late show together. Now his biggest passion is his Gateway P5-90XL. The cur.

It's not like I haven't tried. But, I guess I've been barking up the wrong tree, because no matter how much I try to impress him, his Gateway PC makes him happier and happier every day! And although I'm a mere canine, I know the Gateway P5-90XL is a powerhouse. I've heard about its phenomenal features, especially the Microsoft Office Professional applications — MS® Excel, Access® database, PowerPoint® presentation graphics program, Word and Bookshelf® '94. That's everything he needs even for his demanding work.

He's a veterinary scientist, so he loves to number crunch, create databases, write reports and integrate his findings into presentations. Sometimes I think he'll chase his tail when he talks about the power of the Intel® Pentium™ processor and how fast he calculates the cases of feline viral rhinotracheitis in purebred Siamese cats in the Pacific Northwest using Excel. Plus, the P5-90XL's 16MB of RAM and a whopping 1GB hard drive give him tons of room for his Access database on diseases afflicting short-haired cats in the twentieth century. (I say let the cats die!)

With his P5-90XL he can even run multiple applications simultaneously. He drools about the Object Linking and Embedding (OLE) feature that automatically updates information in an application after he changes it in a different program. And he pulls up feline anatomy images on his 17-inch CrystalScan® monitor in seconds with the lightning-fast speed of the ATI Mach 64 video card. This PC *is* perfect for him.

When he wants to relax he listens to his favorite music CDs on his Gateway PC. The Ensoniq® Soundscape wavetable sound card delivers unbeatable audio quality, and Altec Lansing ACS-31 speakers pump out great highs and heart-pounding bass.

He also goes on and on about Gateway's award-winning service and support and their friendly Midwestern employees. The company's three-year warranty on parts for desktop systems and Gateway monitors is incredible. That's 21 dog years! Gateway customers also get a 30-day money-back guarantee and toll-free technical support. On-site service is available during the first year in most U.S. locations and may be provided without charge if their technicians determine it's necessary. These factors are vital when purchasing a PC in today's dog-eat-dog computer industry.

What's that, Doc? How can you get more information on Gateway PCs and their service and support policies? Geez! Even my own psychiatrist is hounding me. Call or write them and they'll send you a free written copy of their warranty.

ENHANCED IDE

intel inside® pentium PROCESSOR

GATEWAY2000

*"You've got a friend in the business."®*

800-846-2065

*Yes, Dr. Nine, the power of Gateway's Pentium™-based PCs has been unleashed!* It's an epidemic that's spreading from one member of my family to another. Now *she* even has a Pentium-based system from Gateway. I can see why Dataquest,® Inc. reported that Gateway 2000® is the leading supplier of Pentium PCs in the nation — they're everywhere!

She's a freelance writer, and ever since she got her P5-90 Best Buy from Gateway 2000 all she does is rave about its amazing features that increase her productivity — like its 540MB hard drive, 8MB of RAM and a super-fast double-speed CD-ROM. I have to admit, she pumps out tons of work now, and it keeps her out of the doghouse because she never misses a deadline.

She especially digs Microsoft® Bookshelf® 1994 that's part of MS Office Professional. It makes research a snap! Bookshelf includes seven best-selling reference books including *The American Heritage Dictionary, The Original Roget's Thesaurus, The Columbia Dictionary of Quotations, The Concise Columbia Encyclopedia, Hammond Intermediate World Atlas, The People's Chronology, and The World Almanac® and Book of Facts 1994.*

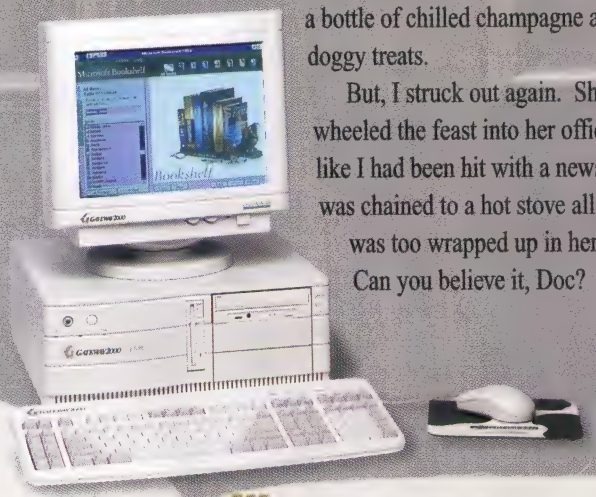
Of course, MS Word, the most popular word processor for Windows, has cool features like spelling and grammar check (she can spell check in 20 languages!), thesaurus and word count. She can even use Word and Bookshelf simultaneously!

Scheduling has never been easier with MS Schedule+ for Windows.™ It helps manage her time, and she can see her schedule at a glance. The PCI local bus graphics and 15-inch CrystanScan® monitor give her an incredible display. It's simply mesmerizing how much her Pentium-based PC has changed her life. Plus it was a great deal at $2,499!

I'm glad she loves her Gateway PC and all of its awesome software, but now *she's* ignoring me too! She's so engrossed with her P5-90 Best Buy she hardly stops to eat.

One day I prepared her a lunch fit for a queen. An elaborate feast really — Belgian endive salad, savory herbed croissants, wild rice pilaf, grilled apricot-ginger chicken breasts, and white chocolate cheesecake with luscious strawberry glaze. I threw in a bottle of chilled champagne and a few of my favorite doggy treats.

But, I struck out again. She didn't bat an eye when I wheeled the feast into her office. I was stunned — I felt like I had been hit with a newspaper! How could she? I was chained to a hot stove all day. But as usual, she was too wrapped up in her Gateway PC to notice me. Can you believe it, Doc?

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intel inside

pentium PROCESSOR

*Special thanks to the Gateway 2000 employees and their families who appear in this ad.*
*And a hearty thank you to "Shea," the golden retriever who provided our canine talent.*

*Doc! I have the solution. I'll get my paws on a Gateway 2000® PC too!*

Why was I such a bonehead? Now I'll be part of the family again.

I'll get a 4DX2-66 Family PC™ — a doggone good value at only $1,899. The kids already have a P5-60 Family PC. I've seen how quickly they can finish their homework with the power of a Pentium-based system. They write reports in no time flat when they use Microsoft® Works'® word processor with spell check and thesaurus, along with unlimited resource information from MS Encarta 1994 Multimedia Encyclopedia. And, when they finish their homework early, they can explore the magic behind the movies with MS Cinemania '94, plus exciting software applications designed just for kids.

Now this new world of education and excitement can be mine too. I'll use Encarta to research my pedigree, and I'll plan for my retirement with MS Money™ — the kids have already formulated their college savings funds with this practical application.

I can even kick back and relax with the wonder of MS Multimedia Golf, and with the Family PC's high-quality sound cards and speakers, I can play music CDs, hear audio clips or record audio — all with stereo sound that delights even my sensitive ears.

I have so many exciting plans! I'll be a "Gateway Groupie" and communicate with other Gateway users on-line with my modem. (If I'm lucky I'll find a mate through an on-line dating service, and we'll have our own litter!)

That's it. I have to get my own Gateway Family PC. Gee, I wonder if they sell PCs to dogs? I know they accept most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. I can also apply for the Gateway 2000 DuoLine™ MasterCard® Card, issued by Dial National Bank, Des Moines, Iowa. Oh, and I'll be sure to ask about their "90 Days No Payment" Program!

Gateway 2000 customers in Canada and Puerto Rico receive toll-free telephone technical service in both countries (see the back page of this ad for special 800 numbers) along with award-winning technical support and CSA approvals. On-site service is available in some Canadian and Puerto Rican locations, and their international shipping rates are among the most competitive in the industry.

Thanks a lot Dr. Nine. You've been a big help. But I won't have time for my weekly appointment anymore — I'll be busy with my new Gateway 2000 Family PC!

Call Gateway 2000 today and get *your* paws on the best value in the PC industry!

GATEWAY2000 FamilyPC

*Experience a fetching new world of education and excitement with a P5-60 Family PC!*

intel inside

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### 4SX-33 FAMILY PC

- Intel® 33MHz 486SX CPU*
- 4MB RAM
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- Local Bus Graphics with 1MB
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- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS® 6.22 & WFW 3.11
- MS Works,™ Encarta, Money,™ Cinemania '94, & Golf
- 3-Year Limited Parts Warranty

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### 4DX2-66 FAMILY PC

- Intel 66MHz 486DX2 CPU*
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- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta, Money, Cinemania '94, & Golf
- 3-Year Limited Parts Warranty

**$1899**

### P5-60 FAMILY PC

- Intel 60MHz Pentium™ CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 16-Bit Sound Card & Altec Speakers
- TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan® Monitor
- Desktop Case
- AnyKey® Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta, Money, Cinemania '94, & Golf
- 3-Year Limited Parts Warranty

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- Intel 90MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- 16-Bit Sound Card & Altec Speakers
- TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta, Money, Cinemania '94, & Golf
- 3-Year Limited Parts Warranty

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## Professional Systems

### 4SX-33

- Intel 33MHz 486SX CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works 3.0 CD
- 3-Year Limited Parts Warranty

**4SX-33 $1299**
**4DX2-66 $1599**
*(w/ 540MB Hard Drive & 8MB RAM)*

### P4D-66

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional CD
- 3-Year Limited Parts Warranty

**$1999**

### P5-60

- Intel 60MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional CD
- 3-Year Limited Parts Warranty

**$2299**

### P5-90 BEST BUY

- Intel 90MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional CD
- 3-Year Limited Parts Warranty

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## Portables

### P5-90XL

- Intel 90MHz Pentium CPU*
- 16MB RAM, 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- ATI Mach 64 with 2MB VRAM
- Double-Speed CD-ROM
- 16-Bit Wavetable Sound Card & Altec ACS-31 Speakers
- 3.5" Diskette Drive
- 17" Color CrystalScan 1776LE
- Tower Case
- AnyKey Keyboard & Mouse
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- 2.94 Lbs., 9.75" x 5.9" x 1.6"
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8MB RAM, 130MB Hard Drive, MS Works
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- 2 PCMCIA Type II Slots (1 Type III)
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***COLORBOOK DX4-75***
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**$3699**

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# Fetchin' Extras!

Doggone good values: Gateway 2000 peripherals and software, sold only with the purchase of a system.

## MULTIMEDIA

### Basic Audio Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC.

- Gateway 2000 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
- 2 Altec ACS-5 speakers

**$119** *(with system purchase)*

### Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq Soundscape 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster, AdLib, Roland MPU 401, MS Windows Sound System and MT 32
- New Altec Lansing ACS-31 three-piece speaker system
- MidiSoft Sound Explorer and Time Warner's Aegis software

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### Altec Lansing ACS-31 Speakers

A Gateway exclusive from Altec Lansing: a three-piece speaker set at a two-piece price. Two 3-inch free-standing speakers crank out up to five watts per channel while the subwoofer can deliver 15 watts of heart-pounding bass. **$99**

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You get nearly $700 worth of software for less than $100! Package includes Cinemania '94, Mad Dog McCree, Tuneland, Mayo Clinic Family Health Book, Better Homes and Gardens Cookbook, The Lawnmower Man, Sitting on the Farm, Mavis Beacon Teaches Typing, Chess Master 3000, U.S. Atlas and World Atlas. You also get a compact disc cleaner and 20-disk storage rack. **$99**

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Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Includes data and fax communication software, CoSession™ Host remote diagnostics, plus a CompuServe® trial membership. **$99**

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250MB internal tape backup unit copies up to 9.5MB per minute. Comes with MS Windows™ and DOS software, one tape and cable. **$149**

*Call the Gateway 2000 special component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers. Sales hours: 7am-9pm Weekdays.*

## PRINTERS

### Hewlett®-Packard 4L LaserJet Printer

A full-featured 300dpi printer loaded with enhanced PCL 5 and 26 scalable typefaces with 1MB standard HP Memory Enhancement Technology.
Includes parallel cable. **$699**

### Hewlett-Packard 4P LaserJet Printer

A 600dpi printer for four times the dots of 300dpi laser printing with enhanced PCL 5 and 45 scalable typefaces. 2MB standard memory and 3 universal SIMM slots available for additional memory or PostScript fonts.
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### Epson® Stylus™ Color Ink Jet Printer

A high-quality color printer at an affordable price! Features 360dpi or up to 720dpi using specially coated paper. Exclusive technology eliminates "feathering." Includes parallel cable. **$579**

### Epson Stylus 800+ Ink Jet Printer

Get the look of a laser at a dot matrix price with the Stylus 800+. Prints 165 characters per second at 360dpi — fast and quiet!
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*Call for other printer options, including more* ***Hewlett-Packard*** *printers.*

## NETWORKING

### Ethernet Adapter from 3Com®

Ultra high-performance 16-bit Ethernet cards from the world leaders in Ethernet technology.
16-bit Triple Media Card supports BNC, AUI and Twisted Pair media **$119**
16-bit Twisted Pair only **$99**

### National Semiconductor

Infomover™ brand NE2000plus™ Ethernet cards
Triple Media Card **$89**
Twisted Pair only Card **$69**

### Token Ring

IBM® 16-bit Token Ring card **$429**

## PORTABLES

Peripherals and upgrades available only with a Gateway portable purchase.

*PCMCIA Cards*

- TelePath 14,400 Fax/Modem. **$249** *(Also in X-Jack version, same price)*
- 9,600/2,400 Fax/Modem. **$149**
- Ethernet adapter. **$149**
- Token Ring adapter. **$449**
- HandBook VGA adapter. **$229**
- Extended VIP warranty. **$100**

**800-846-2065**

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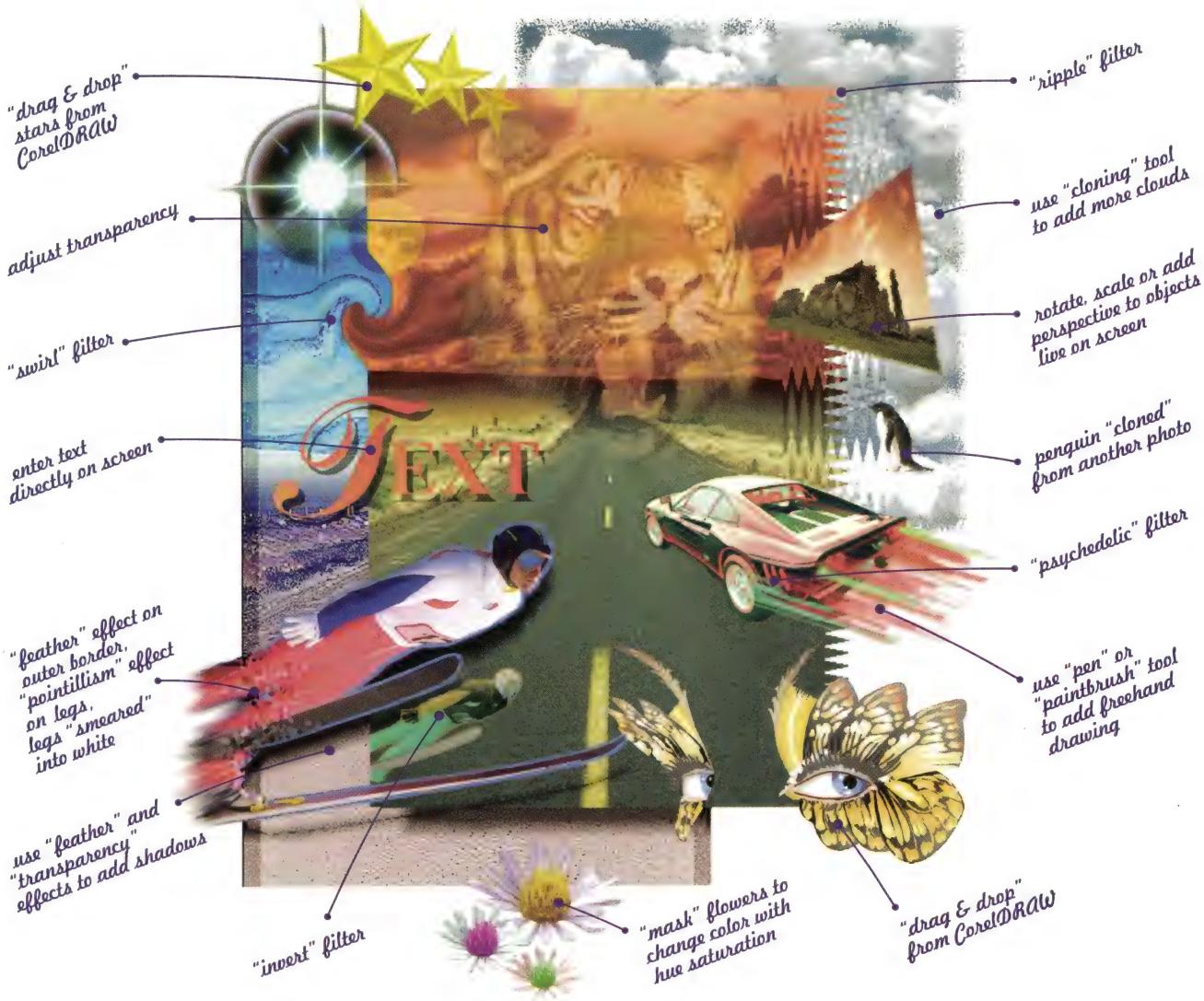


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- *Accurate color calibration system*
- *Corel MOSAIC*
- *Corel CAPTURE*

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- *Create your own palettes and brushes*

### *Easy to Use!*

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- *100 TrueType and Type 1 fonts*
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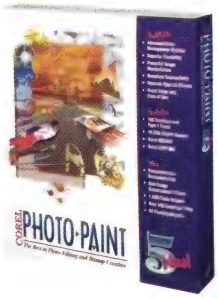


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# Disabling Myths About Enabling Technologies

Imagine you've conducted a nationwide search for a senior-level manager at your company. You've spent thousands of dollars on advertisements and recruiters; you've sorted through hundreds of résumés. Then one day, you find the perfect candidate. You schedule an interview. As he walks into your office, you notice that he is carrying a long white cane.

Of course, you know that the law requires you to treat this person just as you would any sighted job applicant. But you are secretly worried. If you hire him, will you have to spend a small fortune on specially outfitted office equipment? You think it might be easier just to say, "Thank you very much, we'll get back to you." But then you risk losing a potentially valuable employee—and possibly facing a lawsuit.

This month, Susan Portugal, vice president with Bank of America of San Francisco, dispels some myths about hiring people with special needs—and how companies can comply with the law in a cost-effective way. —*Ed.*

### Rolling in Resources

Around the time Congress passed the Americans with Disabilities Act (ADA) in 1992—which requires employers to hire and accommodate workers with disabilities—media reports of nervous bosses began making headlines, as managers worried that adapting workplaces for people with disabilities might hurt their companies' bottom lines.

Ten years ago, locating special equipment for employees with physical, visual, or hearing disabilities was indeed tough. Very few vendors offered the specialized technologies, so the equipment was expensive and hard to find.

Today, things have changed. Consider the case of Joan Smith (not her real name), a blind employee who works in the electronic banking department of the bank. Joan's IBM PC is equipped with a $6000 Versabraille terminal, a device that looks something like a Casio electronic keyboard and sits on her desktop next to her keyboard. When she receives an E-mail message or an electronic text document, the device converts each line of text to a line of braille. Alternatively, when she wishes to write a document or send a message, she touch-types on a standard keyboard, just like her sighted colleagues.

In fact, there are now thousands of hardware and software resources for people with disabilities, making these specialized tools nearly as widely available as the technology used by everyone else. And employers that need to purchase specialized equipment can receive a partial subsidy, as well as technical support, consulting services, and other forms of assistance, depending on the firm's needs and financial resources.

Unfortunately, such specialized computer equipment usually comes with proprietary hardware or software, which can make things difficult if your office operates on a local area network. So it's important to locate a vendor that not only can offer appropriate products but can help your company find ways to get the adaptive technology to work with your existing hardware and software.

### Shopping Around

So where do you find such vendors? If you call 800/232-9675, you can tap into a national database of resources for adaptive equipment. This service is also helpful for finding other employers who have dealt with similar problems. (See "ADA Resources for Employers.")

Selecting a vendor of specialized equipment is no different from choosing any hardware or software provider. We compared prices and reviewed each vendor's reputation for service and support. A lot of vendors have showrooms where you can try out equipment; some let you borrow or rent on a trial basis.

Susan Portugal is a vice president with Bank of America of San Francisco.

EDWARD CALDWELL

While it's now comparatively easy to locate special resources and equipment, complying with the ADA means more than just hiring and accommodating disabled persons. Employers must do something that can be very difficult—to see all people as individuals rather than only as job fulfillers.

### Communicating Job Requirements

Managers interviewing job candidates must understand the requirements of the job in question and must communicate those needs effectively. If you're hiring a secretary, for example, you might easily assume that interviewees understand that the position requires typing a certain number of words correctly per minute. When considering a person with a disability for that position, however, you cannot assume anything: You must say, "This job requires being

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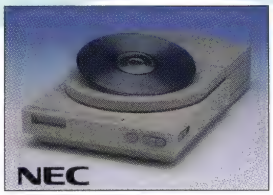


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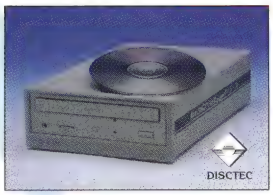


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able to type 60 words per minute," and so on, for every task the job involves.

Companies that formerly took a casual approach to hiring can now find themselves facing legal quagmires. For example, many disabilities—such as dyslexia and some mental impairments—are not immediately apparent. For this reason, every applicant for a given position must be interviewed according to the same standards. (The ADA assistance line, listed above, offers a manual containing questions that can help employers in conducting appropriate interviews.)

Luckily, there's an easy formula for complying with the law: Treat everyone with respect for his or her talents and skills. By doing so, employers may begin to see the ADA not as a thorn in their side, but rather as a tool for improving company culture.

**—Edited by Bronwyn Fryer**

*Bronwyn Fryer is a contributing editor for* PC World. *If you use PCs to manage people and other resources in a business environment, we want to hear from you (see page 12 for contact information).*

### ADA Resources for Employers

- **Abledata**
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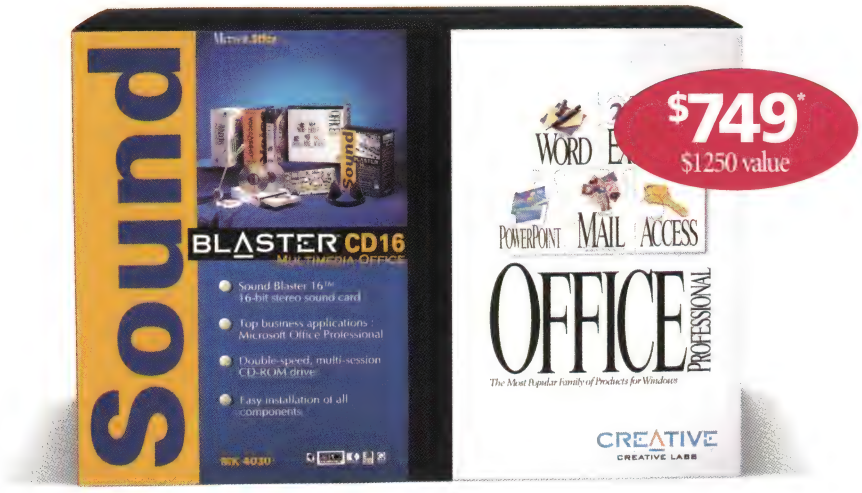


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# Photoware: The Business Case for Digital Photography

Have you seen the color ink jet printers from HP and Canon that are under $750? How about Apple's $700 color digital camera? Or that $150 black-and-white dial camera from Connectix? And did you know color scanners for snapshots are heading into the $199 range?

If you've ever wanted to add a photo or merely some color to documents and presentations, or use an image to supplement database records, the time is almost at hand. Technology and price points for digital photography are about to intersect right in the sweet spot of the business market, and great deals for home users can't be far behind.

Using my Apple QuickTake 100 camera—which I liked so much I actually bought one for my business—I'm starting to add color photographs to my word processing documents and have begun to play with placing images in PowerPoint slides as well. The camera works with Windows or Mac software. The color printers—I've played with several over the past few months—have come down in price and up in image quality. With the $7200 (list) color LaserJet, I'm finding it much easier to make points to my boss using WordPerfect graphics. And even if I didn't have the LaserJet, the color ink jet printers really look quite nice.

I'm quite taken with the new photography and color features I've added to my PC. It's great not having to use a complex program, like Adobe Photoshop or Micrografx Picture Publisher, to manipulate the image.

On the Mac, I'm using a piece of software called PhotoFlash to size, browse, clean up, and place photos into my applications. Sold by Apple, PhotoFlash was built by a Mountain View, California, company called Storm Software. The good news is that Storm is working on easy-to-use PhotoFlash-like software for Windows as well, and they've already released a Windows version of Kid's Studio ($35 to $40 street price), a popular Mac product for creating montages of photos, images, text, and special effects. Hint: Not all the customers are kids. • *Storm Software, Inc.; 415/691-6600. Reader service no. 745*

Storm wants to popularize the concept of "photoware," defined as a group of applications that allow average users to manipulate photographic images as easily as they cut and paste text in a word processor.

Of course, under every silver lining is a big dark cloud, and this is no exception. First, this is another area where Windows trails Macintosh. If all you have is a PC, really good software is several months away.

The hardware also leaves something to be desired. The camera companies are working hard to create inexpensive digital cameras that use existing interchangeable lenses. As far as features and image quality are concerned, the QuickTake 100's fuzzy images are more like those of an inexpensive automatic job than of a $700 single-lens reflex camera, which makes it pricey. I have to wonder whether there will ever be a QuickTake 200, given Apple's quest for profits at any cost.• *Apple Computer; 800/776-2333. Reader service no. 746*

Inexpensive scanners will solve part of the image capture problem by allowing you to use your current camera. The prints you scan in will be about as good as the image from an "inexpensive" digital camera, they just won't get into the computer as fast. On the other hand, you won't be tethered to your computer, downloading images every time the memory gets full. This happens with the QuickTake every 8 or 32 shots (depending on the image resolution selected), so I'm not planning to make it my solo vacation camera.

So when I talk about "playing with digital photography," there really is a bigger element of play involved than of business. But after years spent waiting for hardware and software to make it affordable, it's about time PC photography went mainstream. I look forward to seeing your best shots.

**By David Coursey**

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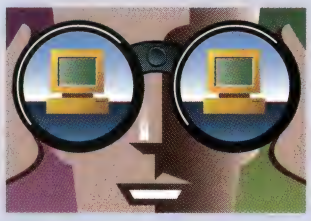
## LOOKING AHEAD



**I wonder about reports that Novell has reached some sort of détente with Microsoft. Over the next few months we'll see whether the animosity between the two—fanned by Novell's role in the federal investigation of Microsoft—has really been reduced. Novell is naive if it thinks Microsoft is going to give up its plan to dominate networking, détente or not...Traveling Software was the last of the major software companies to release a Windows version of its flagship product, but its new LapLink for Windows is a nice package, adding remote control features and improving overall performance... WordPerfect's new 6.1 release for Windows isn't earthshaking, but WordPerfect has invested heavily in linguistic technology, which is just beginning to find its way to consumers. Look at the improved grammar checker or the capability to search and replace entire word forms. This not only allows you to change "purchase" to "buy" but also changes "purchased" to "bought" and "purchasing" to "buying" across an entire document with a single command.**

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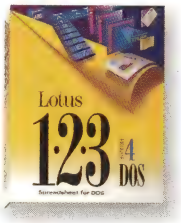


1-2-3 R4 for DOS incorporates user suggestions like Column Fit-Widest, a feature that automates column formatting to accommodate the biggest entry; a built-in

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can explore all kinds of scenarios, or work with all kinds of people on the same spreadsheet, without ever losing track of your thinking. 1-2-3 for DOS is also mail-enabled, so it's easy to share your work with anyone on your network.

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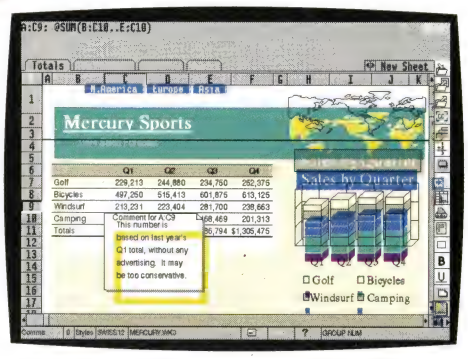


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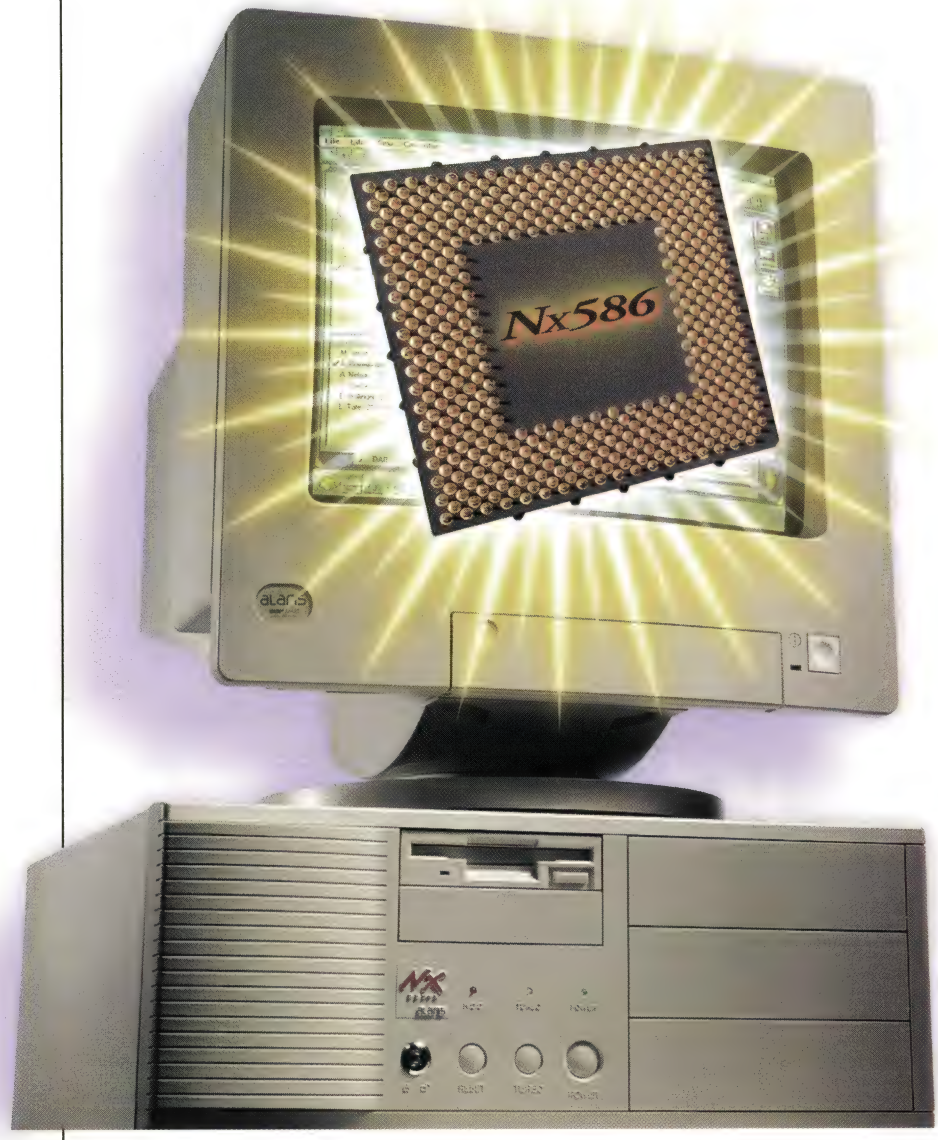
# THE PENTIUM ALTERNATIVE

**There's a new chip in town—NexGen's Pentium-compatible Nx586. Some two dozen vendors are using it to deliver PCs that rival Intel-based Pentiums. Here's the first arrival.**




**TEST DRIVE** At last you have a choice. If you want better than 486 performance, you no longer have to rely on Intel for a Pentium PC. Your alternative: systems with processors made by NexGen, a scrappy Silicon Valley chip-design firm backed by wads of cash from such PC titans as Compaq. After six years under development, the NexGen chip is finally appearing in desktops. Among the leaders of this first wave is Alaris, a small system manufacturer with big allies (including IBM). Alaris offers an attractive alternative to a Pentium PC: the Alaris Nx586VL, which uses the NexGen Nx586-P90, an inexpensive, Pentium-class CPU that runs DOS and Windows flawlessly—at speeds that rival those of most powerful Pentium chips and should have Intel engineers sweating bullets.

*PC World* tests of a preproduction Alaris Nx586VL show its performance to be on a par with that of the average 90-MHz Pentium PC. And thanks in part to the chip's low cost, systems with 8MB of RAM, a 340MB hard disk, and a 14-inch monitor will sell for a mere $2589—a price comparable to that of a similarly configured Pentium-90 system, but a bit on the high side when contrasted with the least-expensive Pentium-90 models from Dell and Gateway. As anyone who has shopped for PCs recently can testify, pricing is extremely volatile, and the NexGen system vendors we spoke with pledged to offer PCs priced $200 to $300 below comparable Pentium systems.

The numbers tell only part of the story. Although the CPU in the Alaris system is dubbed the Nx586-P90, it actually runs at 84 MHz (NexGen appended the P90 suffix because the chip is designed to match the performance of Intel's 90-MHz Pentium).

Edited by Russell Glitman

According to NexGen, if the Nx586 were run at 90 MHz, it would beat a 90-MHz Pentium by about 7 percent—a claim our test results bear out. This prowess suggests that the Nx586 is inherently faster than any other chip currently available. And because IBM will manufacture the chip using its latest .5-micron technology, NexGen should be able to satisfy high demand and still maintain high quality. In addition to the P90, NexGen will offer P100, P80, and P75 flavors of the chip for desktops and notebooks. They will run at 93 MHz, 75 MHz, and 70 MHz, respectively.

**PC World tests of a preproduction Alaris system using NexGen's Nx586 showed its performance on a par with that of the average 90-MHz Pentium PC.**

Certified as Windows compatible by Microsoft and accorded top compatibility ratings by independent testing lab XXCAL, the Nx586 appears able to handle any software the Pentium can run—*PC World*'s tests turned up no software compatibility problems. However, the chip is *not* pin compatible with either 3-volt or 5-volt Pentiums, which means a new motherboard design is required. Currently, Alaris is the only supplier of Nx586 motherboards, but at least 23 other vendors plan to sell Nx586 systems.

Rajeev Kumar, general manager of Blackship Computers, echoes the enthusiasm expressed by many vendors who've jumped on the NexGen bandwagon: "The Nx586 is more affordable than the Pentium at both CPU and system levels. It opens up 586-class performance to mainstream users."

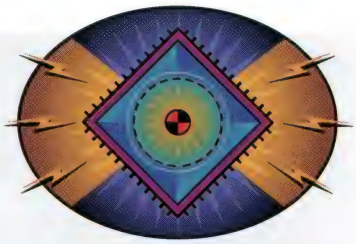
### NexGen Inside

How did NexGen succeed where others faltered? Chip makers Cyrix, IBM, and AMD have yet to introduce Pentium-class processors, instead offering Intel compatibles with 386- and 486-class performance. The secret to NexGen's success, according to the company's vice president of sales and marketing, Dana Krelle, is that the Nx586 was "independently developed in every respect. Only an independent design can be on the leading edge." Of course it also saves you from the kinds of legal wrangles that have dogged AMD.

Nx586 development began in 1988, shortly after NexGen was established with seed money from Compaq, Olivetti, Paine Webber, and others. From the start, says Krelle, "the company was absolutely committed to achieving leadership in *x*86 performance." The goal was to make a chip with the performance advantages of reduced instruction set computing (RISC) chips as well as built-in *x*86 compatibility.

RISC instructions are short and all of equal length, while the complex instruction set computing (CISC) instructions that *x*86 CPUs use are longer and of varying length. To serve its RISC core, the Nx586 uses a built-in decoder to translate *x*86 CISC instructions into a special set of *x*86 RISC instructions, which are then divided and processed simultaneously at high speed by two RISC execution units. The Pentium also has dual execution units, but because they crunch on CISC instructions, the simultaneous execution isn't as clean and symmetric, so there's a slight drag on performance. Krelle also notes that NexGen's RISC architecture will make it easier to add execution units and boost performance in future versions of Nx chips.

The Nx586 architecture offers several other advantages. First, unlike other Pentium competitors, such as IBM's PowerPC and Digital Equipment's Alpha RISC chips, NexGen chips do not have to rely on emulation to run Windows applications, which makes them superior to these alternatives.



## News Monitor

**WINDOWS UPDATE: Previously known as Chicago and expected to ship by year-end, Windows 95 won't be released until mid-1995. Paul Cubbage, a software analyst at the market research firm Dataquest, expects Microsoft to ship 1 million to 2 million copies a month of Windows 95, due to bundling deals with vendors and strong demand from Windows users. "If it runs fast and reliably, it'll have a huge reception," Cubbage says. "But we all know that version 1.1 will be the one that runs, right?" At Microsoft, as they say, quality is job 1.1.**

**HOME PCs GET SERIOUS: Technologically speaking, PCs designed for the home have always lagged behind products designed for the office. That's all changing. The newest home PCs have sleek designs and advanced features. Packard Bell and AST introduced new home PCs in October, and now IBM and Compaq have rolled out updated home PC lines. Compaq bills its Presario 500—an all-in-one multimedia PC loaded with speakers, television-reception capability, and speakerphone—as the ultimate home appliance. The device uses a 486-66 chip and has a street price of about $1900.**

**IBM's multimedia Aptiva systems provide advanced functions such as voice recognition for Windows commands; a "wake-up" feature that automatically turns on the PC for an incoming fax or phone call; and a scheduler that lets you wake up the PC at a certain time to, for instance, download online information. The top-of-the-line IBM Aptiva sports a 60-MHz Pentium**

*(continued on page 59)*

PHOTOGRAPHS: JOHN GREENLEIGH; PHOTO ILLUSTRATION: JEFF BERLIN; ILLUSTRATION: JEFFREY PELO

Second, instead of the Pentium's dual 8K memory caches, the Nx586 has two 16K caches. And third, unlike the Pentium, the Nx586 chip has a built-in controller for a secondary memory cache. Fast 486 and Pentium systems must include a secondary memory cache and controller to reduce the chance that the processor will need to access main memory and slow down as a result. Putting the secondary cache controller on the processor boosts performance—and lowers system manufacturing costs, since creating a separate cache controller chip is unnecessary.

### Alaris Nx586VL

**Pentium performance and compatibility.**
**Key Features: NexGen P90 processor • VL bus • 16MB cache option**
**Pricing: $2289 (without monitor) to $4059**
**Availability: Immediate**
**Alaris, 510/770-5770, 510/770-5769 (fax)**
**Reader service no. 753**

The Nx586 has only one obvious failing: It lacks a floating-point unit (FPU) for math-intensive operations, a feature all Pentium chips have. An Nx586 version with a built-in FPU will be available in the first half of next year, but until then, a Pentium system is a much better choice for CAD or statistical applications. All Nx586 chips will use ZIF sockets, enabling you to upgrade to an Nx586 with a built-in FPU.

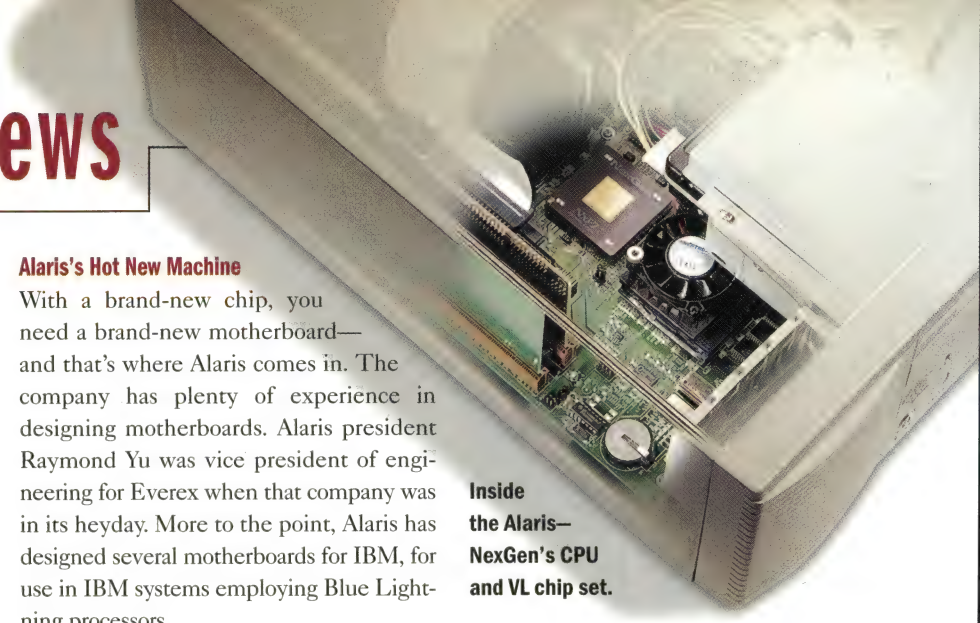
### Alaris's Hot New Machine

With a brand-new chip, you need a brand-new motherboard—and that's where Alaris comes in. The company has plenty of experience in designing motherboards. Alaris president Raymond Yu was vice president of engineering for Everex when that company was in its heyday. More to the point, Alaris has designed several motherboards for IBM, for use in IBM systems employing Blue Lightning processors.

Two years ago Alaris decided to sell systems as well as motherboards. Interestingly, Alaris's product line is almost completely Intel-free, using IBM's Blue Lightning and SLC CPUs—and now the Nx586. By the time you read this, Alaris should be selling its Nx586-P100 system in limited quantities, in addition to its P90 units. Yu says the company's objective has always been to provide "better price/performance—and we think NexGen offers that." Alaris also aims to be the dominant supplier of Nx586 motherboards.

Inside the Alaris Nx586VL system, we found a compact Alaris motherboard with a clean design free of patch wires. A fairly standard 256K secondary memory cache is installed and is not upgradable.

Next to the Pentium-size Nx586 CPU sits a chip nearly as big, the NexGen NxVL, which contains the logic for controlling the system's VL bus. This chip divides the system's 84-MHz clock in two, so the VL bus runs at 42 MHz—just under the 50-MHz limit of most VL expansion boards.



**Inside the Alaris—NexGen's CPU and VL chip set.**

Judging by the system's Freelance for Windows scores, this synchronous VL design yields slightly above average graphics performance when the chip is paired with the 2MB Diamond Stealth VL board that was provided for testing.

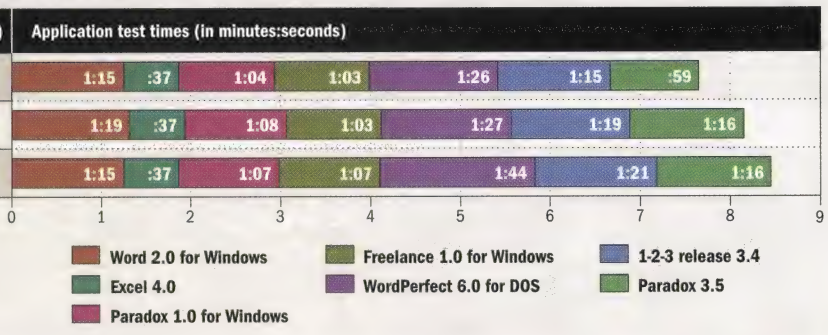
Next year, Alaris will offer a PCI system that uses NexGen's NxPCI chip set. The PCI bus will run asynchonously at 33 MHz, but PCI's superior buffering and faster 64-bit transfers will probably deliver performance slightly better than that of the current VL system.

The Alaris Nx586VL we tested also came with a 540MB Western Digital Caviar IDE hard disk hooked to a 32-bit Bus Logic BT-410A interface board, which plugged into a VL slot. To deliver top performance for our tests, Alaris populated the Bus Logic board with a whopping 16MB disk cache (which adds $900 to the price). With the cache installed, the system beat the mean Pentium-90 system by about 5 percent. Without the hardware cache—using an ordinary SmartDrive software cache instead, an

## TEST REPORT

### NexGen Chip Challenges Pentium Performance

| System | Price | CPU | RAM (MB) | Application test times (in minutes:seconds) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Alaris Nx586VL[1] | $4059 | Nx586-P90 | 16 | 1:15 | :37 | 1:04 | 1:03 | 1:26 | 1:15 | :59 |
| Alaris Nx586VL | $3168 | Nx586-P90 | 16 | 1:19 | :37 | 1:08 | 1:03 | 1:27 | 1:19 | 1:16 |
| Average Pentium[2] | $3210 | Pentium-90 | 16 | 1:15 | :37 | 1:07 | 1:07 | 1:44 | 1:21 | 1:16 |




**Shorter times are better.**

[1]Includes 16MB caching disk controller.
[2]Average score and price of six Pentium-90 systems.

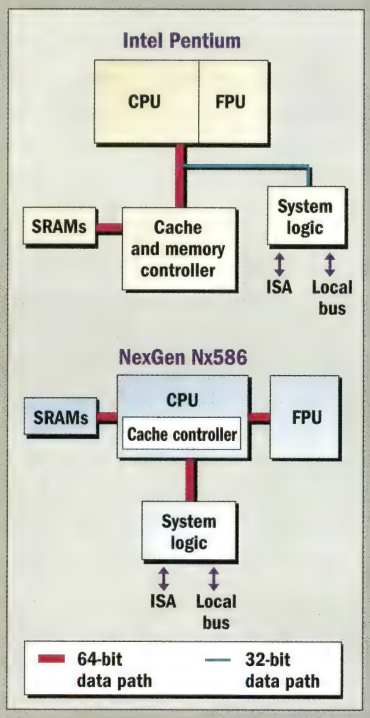
Tests run on preproduction Alaris unit.
PC World Test Center application benchmarks.

PHOTOS: JOHN GREENLEIGH; PHOTO ILLUSTRATION: JEFF BERLIN

arrangement far more realistic for most users—system performance fell below that of the mean Pentium-90 system.

The 540MB Caviar hard disk, 16MB of memory, and $500 14-inch IBM monitor drove the price of the model we tested to $3168 (with the excessive 16MB disk cache, the price rises to over $4000). A base-configuration Nx586VL, without a monitor but including a 420MB hard disk and 8MB of RAM, can be had for only $2289. That's probably a good configuration to buy this system in—the IBM monitor is high quality, but $500 is too much to pay for a 14-inch model, when you can buy a 15-inch NEC 3FGe for about the same price.

## NexGen's Integrated Cache Controller Ups Performance




### Joining the NexGen Club

Most large manufacturers of PCs prefer to develop their own motherboards, which is one reason the current list of companies offering Nx586 systems is limited to smaller vendors willing to buy their motherboards from Alaris (NexGen says a couple of Taiwanese companies will also soon be offering motherboards for the Nx586). However, Compaq and IBM have already allied themselves with NexGen, so it makes sense that these companies would eventually offer Nx586 systems, too.

Without mentioning any names, NexGen's Krelle observes that larger companies take longer to evaluate new technology, and that this is the main reason big names have failed to show up at NexGen's debut. Could pressure from Intel be a factor? Not so, says Krelle. "Over the last six to nine months, large companies have begun going to second sources—take Compaq's decision to use AMD, for example. All companies are open to choice."

Simon Chang, purchasing manager at PC maker Top Data, cites other advantages to going with NexGen. If you're a smaller vendor, says Chang, you aren't a high priority for Intel. "We can get better support from NexGen. We get samples, technical information, and technical help right away." Top Data did its own compatibility testing, trying to break the chip with Windows NT, Windows for Workgroups, and NetWare. Chang said no problems emerged.

Early last month, Texas system manufacturer Compu-Tek unveiled six new Nx586 systems. Chris MacFarland, national sales manager for Compu-Tek, says his company decided to go with NexGen because it liked the processor design—and because the price and performance looked great. "We expect to sell Nx586 systems for $200 to $300 less than equivalent Pentium systems," says MacFarland.

The real benefit for you is that Intel's monopoly on the high end has been busted. Recently, Intel lowered Pentium chip prices significantly, and those savings are already showing up in a new round of price cuts on Pentium systems. In coming months look for Alaris and other NexGen systems to vie for spots on *PC World*'s Top 20 charts. As fully loaded 90-MHz Pentium systems dip toward the $2500 mark, moving up to top performance will make sense, even if you're not exactly sure what to use all that computing muscle for at this point. Rest assured—it won't be long before a spiffy new application eats it up.

**—Eric Knorr**

JEFFREY PELO

# News Monitor

*(continued from page 57)*

**processor. The products have estimated street prices of $1200 to $2600 (without monitor).**

**LOOK MA, NO CABLES: Your days of wrestling with cables are numbered. A wave of new products using infrared technology will hit in 1995, thanks to the new IRDA (Infrared Data Association) standard. Infrared, a low-cost technology used in devices such as TV remote controls, can be used to transfer data in point-and-shoot fashion. If your PC or peripheral has a transmitter/receiver, you can transfer or synchronize files between notebooks and desktops or send a file to a printer.**

**In 1993, 1 million infrared-capable products shipped. Don Salinger, vice president of communications research at Dataquest, expects 4 million units to ship in 1994 and up to 40 million units by 1997. Vendors such as IBM, DEC, Sharp, and Hewlett-Packard are expected to introduce products that adhere to the IRDA standard.**

**WORLD'S FASTEST MODEM: AT&T Paradyne has announced a software upgrade for its Comsphere modems that will enable them to transmit data at up to 33,600 bits per second (bps)—more than 15 percent faster than the 28,800-bps rate of today's speediest modems. While the Comsphere 3800-Plus and 3900 modems are now available, the 33,600-bps software upgrade won't be available until December, says AT&T spokesman Garrick Case. The $1200 products are designed for**

*(continued on page 61)*

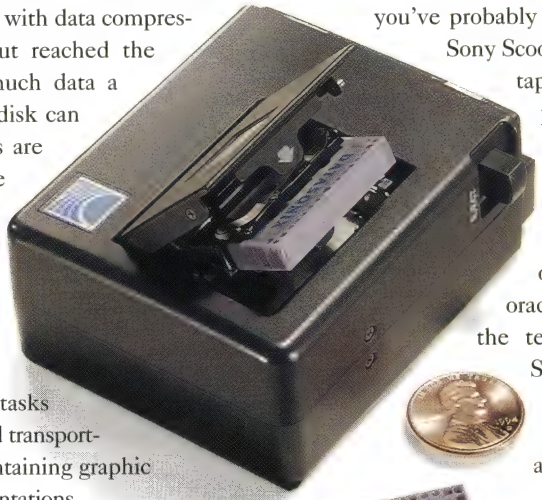
# Is the Floppy Disk Dead?

In the evolution of computer technology, the venerable floppy disk has changed little. Sure, it's gone from a low-capacity, 8-inch slab to a compact, high-capacity, 3.5-inch package. But inside, it's still a flexible plastic disk coated with magnetic material—technology developed over 50 years ago for analog sound recordings. Even with data compression, we've about reached the limits of how much data a standard floppy disk can hold. CD-ROMs are helping eliminate the floppy disk shuffle, but because they are read-only, they are useless—or at best inconvenient—for such tasks as backing up and transporting large files containing graphic images and presentations.

New technologies will provide new options for storing and using data. What's surprising is that unlike most of what's at work in your garden-variety PC—technologies that have trickled down from military or industrial applications—these new technologies come directly from consumer electronics. In fact, the two major alternatives to the floppy are based on designs developed by Sony for the music business.

### Gigabytes at Your Fingertips

Unless you live in Europe or Japan, you've probably never seen the Sony ScoopMan, a digital tape recorder and player that puts near-CD-quality audio in a tiny package. Now Datasonix of Boulder, Colorado, has licensed the technology from Sony and created a unique computer peripheral: the Datasonix Pereos. This 10-ounce device is ideal for mobile-computer users who need to transport large amounts of data, and, of course, it will fit on any desktop. The first version, which sells for $595 and is available now, connects to a PC via a parallel port. PCMCIA and SCSI interfaces are on the way.



**The Pereos from Datasonix holds more than a gigabyte on each tape.**

Pereos tapes are about one-fourth the size of standard dictation cassettes and weigh one-tenth of an ounce. Each holds 1.25GB of data using Stac compression and is expected to sell for $25 to $30.

The Sony technology behind Pereos uses VCR-like helical-scan recording, in which data tracks are recorded and read in diagonal stripes across the tape. The company claims transfer rates of 5MB per minute—a little slower than high-end floppy drives, which can transfer 1 megabit per second, or more than 7MB per minute.

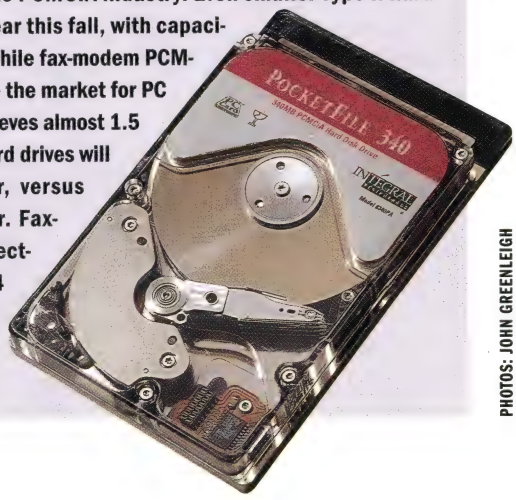
The Pereos's software couples ease of use with interesting bells and whistles. It maintains an index on your hard disk of all your tapes, so you can quickly search for a particular file. Once you identify the file, the software tells you which tape to load. It also helps you create a boot floppy to restore your system if your hard disk fails. You can save specific combinations of applications

**Movable Feast: The storage capacity of PCMCIA hard drives will approach that of traditional desktop hard disks early next year, when Integral Peripherals is due to ship its 340MB and 420MB Type III drives. This fall, the company will expand this series of PocketFile drives with a 260MB model, to sell for about $790.**

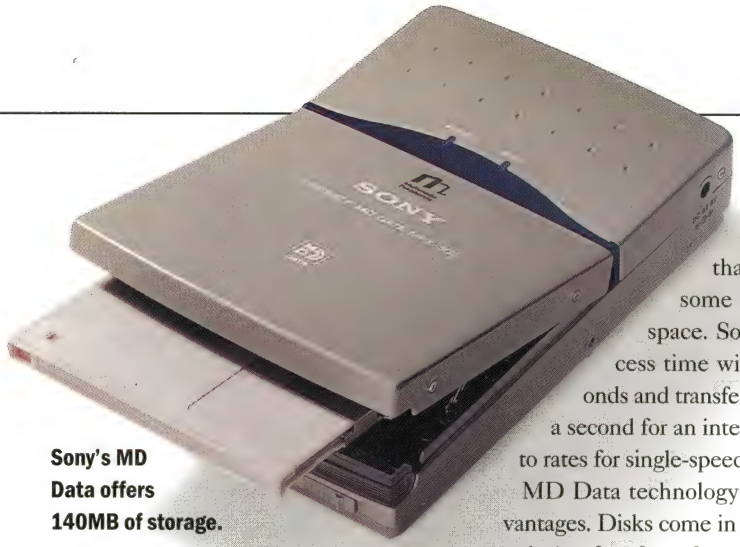
**Built for the mobile computing environment, these 1.8-inch high-capacity drives can withstand more than 150 g's of shock while operating and 750 g's at rest (most PCMCIA drives can withstand no more than 100 g's while operating). Integral achieves this durability with a unique head loading and parking technology that prevents the read/write heads from contacting the media. A suspension system further insulates the drive from shock.**

**The 420MB drive has three platters and weighs just over 3 ounces. It's expected to sell for about $925. The 260MB and 340MB drives use two platters and weigh 3 ounces; the latter should be available for less than $860.**

**Integral is likely to be joined by several other developers in offering 400MB and larger drives next year, according to Andy Prophet, principal of AP Research, a Cupertino, California, market research firm that tracks the PCMCIA industry. Even smaller Type II hard drives should appear this fall, with capacities up to 80MB. While fax-modem PCMCIA sales dominate the market for PC Cards, Prophet believes almost 1.5 million PCMCIA hard drives will be sold next year, versus 630,000 this year. Fax-modem sales, expected to be about 1.64 million in 1994, should reach 3 million next year.**




PHOTOS: JOHN GREENLEIGH




**Sony's MD Data offers 140MB of storage.**

and data files for such uses as creating customized configurations for different users of a single laptop.

### Music to Your PC's Ears

The other Sony floppy disk alternative looks like a standard floppy disk, but smaller. It's based on the 2.5-inch Mini Disc (MD) Data technology, which entered the audio market more than a year ago. Its magneto-optical technology uses Sony's proprietary compression technique to store 74 minutes of CD-quality audio. In the computer data realm, that translates to some 140MB of storage space. Sony claims that access time will be 300 milliseconds and transfer rate 150 kilobytes a second for an internal model, similar to rates for single-speed CD-ROM drives.

MD Data technology offers unique advantages. Disks come in three flavors: read-only (perfect for software distribution); rewritable (for backup and standard applications); and hybrid, with both read-only and rewritable sections (for, say, interactive games). Rewritable disks should cost about $30. Drives with SCSI, PCMCIA, and parallel interfaces will appear this fall. By year-end, Sony will sell a 12-ounce Walkman-size portable MD Data drive that should cost between $550 and $750. Pricing on an internal drive wasn't available at press time.

### Packing the Bits

Finally, Swan Instruments of Santa Clara, California, is about to introduce a floppy disk drive that operates more like a hard disk. In fact, it *is* a hard disk—in part. Each Swan FRD series drive is the size of a standard 3.5-inch floppy disk drive. Inside is a hard disk (either 88MB or 170MB) and a high-capacity floppy disk drive that uses specially formatted floppy disks available in 44MB and 88MB capacities.

The internal hard drive allows you to back up data quickly from one of the high-capacity floppies. Because not everyone's hard drive has 88MB of free space, this option is a great convenience. According to Swan, the drive can also read and write standard 3.5-inch 1.44MB and 720K floppies about ten times faster than can a typical floppy disk drive.

The 44MB floppies will sell for $20 each, and the 88MB for $30. The 88MB drive will sell for $300, and the 170MB for $359. These prices and capacities make the drives a viable alternative to 21MB floptical units.

Of course, the handy, ubiquitous standard floppy disk will be with us for a long time. But these new technologies offer compact alternatives if you have to carry around large amounts of data.

**—Stan Miastkowski**

## Pereos

**1.25GB of storage on a 1/10-ounce tape.**
**Key Feature:** Ten-ounce parallel-port drive
**Pricing:** $595, tapes $25 to $30
**Availability:** Immediate
Datasonix, 800/328-2779
Reader service no. 754

## MD Data

**140MB of storage on a 2.5-inch floppy.**
**Key Feature:** Plays music disks, too
**Pricing:** Portable unit $550 to $750, disks about $30
**Availability:** November; portable model due by year-end
Sony, 800/352-7669
Reader service no. 755

## FRD 3128, 3258

**44MB or 88MB on a 3.5-inch floppy.**
**Key Feature:** Ten times faster than standard floppy drives
**Pricing:** $300 to $359, disks $20 to $30
**Availability:** Early 1995
Swan Instruments, 408/727-9711
Reader service no. 756

ILLUSTRATION: JEFFREY PELO

# News Monitor

*(continued from page 59)*

high-end applications, such as video conferencing and LAN-to-LAN communications. The company also plans to license the high-speed protocol to other modem vendors, says Case.

**WORKING TOGETHER BECOMES MORE AFFORDABLE:** Lotus's $130 Notes Express, a pared-down version of the company's $495 Notes client, lets users send mail, participate in online conferences, and perform many of the basic functions of its more expensive forebear.

Vivo Software's Vivo320 provides PC-based video conferencing for $1995. The product adheres to the H.320 standard, which allows it to communicate with many group video-conferencing products. With this capability you can make presentations to a large group without visiting the site. Currently, similar products cost about $3000.

**MOTOROLA'S POWERPC DESKTOPS:** While Apple Computer has built its Power Mac line around the PowerPC processor, other PowerPC-based desktops haven't materialized—until now (IBM's systems have been delayed until 1995). Motorola, which developed the PowerPC chip with Apple and IBM, is introducing a series of PowerPC desktops and servers that run Windows NT or UNIX. First out are high-end servers using the PowerPC 603 and 604 processors, with desktop PCs running Windows NT likely to follow.

Edited by Randy Ross
Contributors: Joe Abernathy, Jeff Bertolucci, and Laurianne McLaughlin

# ThinkPads Offer Power, CD-ROM, Voice

In the race to create a notebook that does everything a desktop PC can, IBM has pulled away from the pack. Its latest high-end ThinkPads offer powerful CPUs, big hard drives, unique telephony and multimedia features, and in one model, a full-size, double-speed CD-ROM drive. If your desktop can do it, chances are these ThinkPads can, too.

These additions, the 755CE, 755CSE, and 755CD, supplement the existing 755 series of notebooks, which IBM will continue to sell. With estimated street prices ranging from $4500 to $8600, these notes aren't for those of limited means, though.

### On Your Mark, Get Set...

Even before you get to the bells and whistles on these notebooks—and IBM includes a lot of useful noisemakers here—it's clear that the new ThinkPads are developed around a set of distinctive core technologies. On the processor front, they offer the power of Intel's 100-MHz DX4 processors, which should make these notebooks the match of many desktop Pentium-60 PCs. Even using the alternative 75-MHz DX4 processor, these ThinkPads should be competitive: A preliminary benchmark test of a preproduction 755CE with a DX4-75 and 16MB of RAM found it to be faster than the average of six DX4-75 notes we've tested (each with 8MB of RAM). IBM's performance advantage was what we would expect from a system with more memory. The finished notebooks will likely be even faster.

IBM has always distinguished itself with superior display technology, and this generation of ThinkPads continues that tradition. Improvements to the onboard local-bus video subsystem allow the ThinkPads to display 65,536 colors simultaneously—a feat duplicated by Panasonic's new V41 (see "Mobile CD Chorus"). Most competing products can display only 256 simultaneous colors. The 10.4-inch active-matrix screen on the 755CE and CD employs a new glare-reducing technique called black-matrix technology. With this technology, the individual transistors used to create pixels on the screen are treated to decrease reflection in bright light conditions, such as outdoors on a sunny day. Although I was unable to try the unit outdoors, in an office setting I found the screen a tad darker than past IBM displays, yet it was easier to view at an angle. Only the terrifically bright screen on the Panasonic V41 surpasses it for clarity. The 755CSE, the dual-scan passive model, also offers a 10.4-inch screen, matching the largest dual-scans available.

There's plenty of room for storage in these ThinkPads—they are among the first notes to offer an 810MB drive. Like the existing 755 line, they weigh an acceptable 6.4 pounds (7.2 pounds for the CD model). The CE and CSE will run for up to 9 hours and the CD model for 7 hours on a single battery charge, according to IBM. All three notebooks also include infrared file transfer capabilities, with beams on the front and back of each unit.

### IBM ThinkPad 755CE, 755CSE, 755CD

**New ThinkPads offer cutting-edge technology, ranging from 100-MHz DX4 CPUs and 810MB hard drives to speakerphones and integrated full-size CD-ROM drives.**

**Key Features:** 10.4-inch antiglare color screen
- 810MB hard drive

**Pricing:** $4500 to $8600
**Availability:** Immediate
IBM Corp., 800/772-2227

### The 7-Pound Office

Now for the fun stuff. The new ThinkPads use IBM's MWave MDSP2780 digital signal pro-

**PORTABLE MULTIMEDIA: IBM's 755CD includes a CD-ROM drive, stereo sound, and video.**

1 Removable 5½-inch double-speed CD-ROM drive
2 High-speed infrared communications ports
3 PAL and NTSC video lines in and out
4 Stereo speakers and volume control

MARC SIMON

# The World's Largest Photo CD-ROM Collection

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## Mobile-CD Chorus

**IBM isn't the only vendor with a notebook that includes a CD-ROM drive. Panasonic, which at press time was expected to begin shipments of its V41 notebook in early October, has one too. The screen quality on the V41 technically meets, and to my eyes exceeds, IBM's, but both are likely to pale beside the NEC Versa M due later this fall. It's expected to include a screen capable of displaying 16.8 million colors simultaneously and will be available with a 100-MHz DX4 processor for $6159. It should be shipping by the time you read this.**

**Panasonic's V41 includes an under-the-keyboard, double-speed, 5¼-inch CD-ROM drive and 16-bit stereo sound. Unlike with the ThinkPad, however, this drive is not removable. The list price for a V41 with an active-matrix screen that displays 65,536 colors simultaneously, a 450MB hard drive, and a 100-MHz DX4 CPU is $7199. It weighs 9 pounds. A second battery, included, fits into the removable floppy drive bay.**

**TelePad Corporation of Reston, Virginia, will ship the TelePad 3, which will include special "bays" that can accommodate a CD-ROM drive or a floppy drive/PCMCIA combination unit. (The CD-ROM drive is expected to be available by the second quarter of next year.) With the CD-ROM drive, total weight should be less than 8 pounds. The unit, including a CD-ROM drive and a dual-scan passive screen, will cost about $6000.**

cessing (DSP) chip, an extremely versatile slice of silicon that functions as a 14.4-kilobits-per-second (kbps) fax-modem, a Sound Blaster–compatible sound card, and a telephone answering machine, depending on the software you use.

The included MWave software provides such telephony features as a speakerphone and voice mail. The CE and CSE ThinkPads include a monaural speaker with a volume control dial, and both models double as a hands-free speakerphone for instant teleconferencing. All the notes also come with phone-dialing software. Just use the keyboard to dial the number, and the speaker kicks in.

When you're on the road, you can plug a phone line into your ThinkPad and callers will hear your greeting and be able to leave confidential messages. The modem distinguishes between incoming voice, fax, and data calls, so you'll never miss a communication.

The DSP's modem capability is upgradable via software to 28.8 kbps. Because the DSP is integrated into the system, the unit's single PCMCIA slot remains free to accept two PCMCIA Type II cards or one Type III card.

The DSP also provides better audio quality than previous ThinkPads. The greatest improvements to its audio capabilities are Sound Blaster compatibility and the ability to play MIDI files using wave-table synthesis, for more realistic music in presentations and games.

### 755CD: The Portable Home Entertainment Center

For those who want a notebook that's not all work, IBM offers the 755CD. Just .3 inches thicker than the other ThinkPads, this is one of only a few notebooks that offer an integrated 5¼-inch CD-ROM drive and stereo speakers. The removable double-speed CD-ROM drive sits underneath the lift-up keyboard, snapping into a slot that can also be occupied by a floppy drive.

The 755CD includes all the communications and multimedia features of the CE and CSE, and even enhances them. You get loud, clear stereo sound from the 755CD's two speakers, which are located at the top of the keyboard, as is a volume control dial. The product also has a MIDI port.

Think the 755CD has all the multimedia you can use? Well, there's even more than you think. With this notebook, you can plug in a video camera to jazz up your presentations and documents with video clips, or connect to a television to deliver your presentation on a big screen. IBM's powerful video subsystem lets you play video stored on the hard drive in a full-screen window without the distortion or choppiness common on PCs that don't have this special video circuitry. The unit supports both PAL and NTSC standards.

These revamped ThinkPads are chock-full of new features that redefine both notebooks and mobile computing. For the first time, you can enjoy mobile computing without compromise.

**—Randy Ross**

## Simon Says

**What most road warriors dream of is a device that combines a palmtop PC with a phone, fax machine, pager, and cellular modem. I've found just the thing: the new Simon cellular phone, made by IBM and sold by BellSouth for $899.**

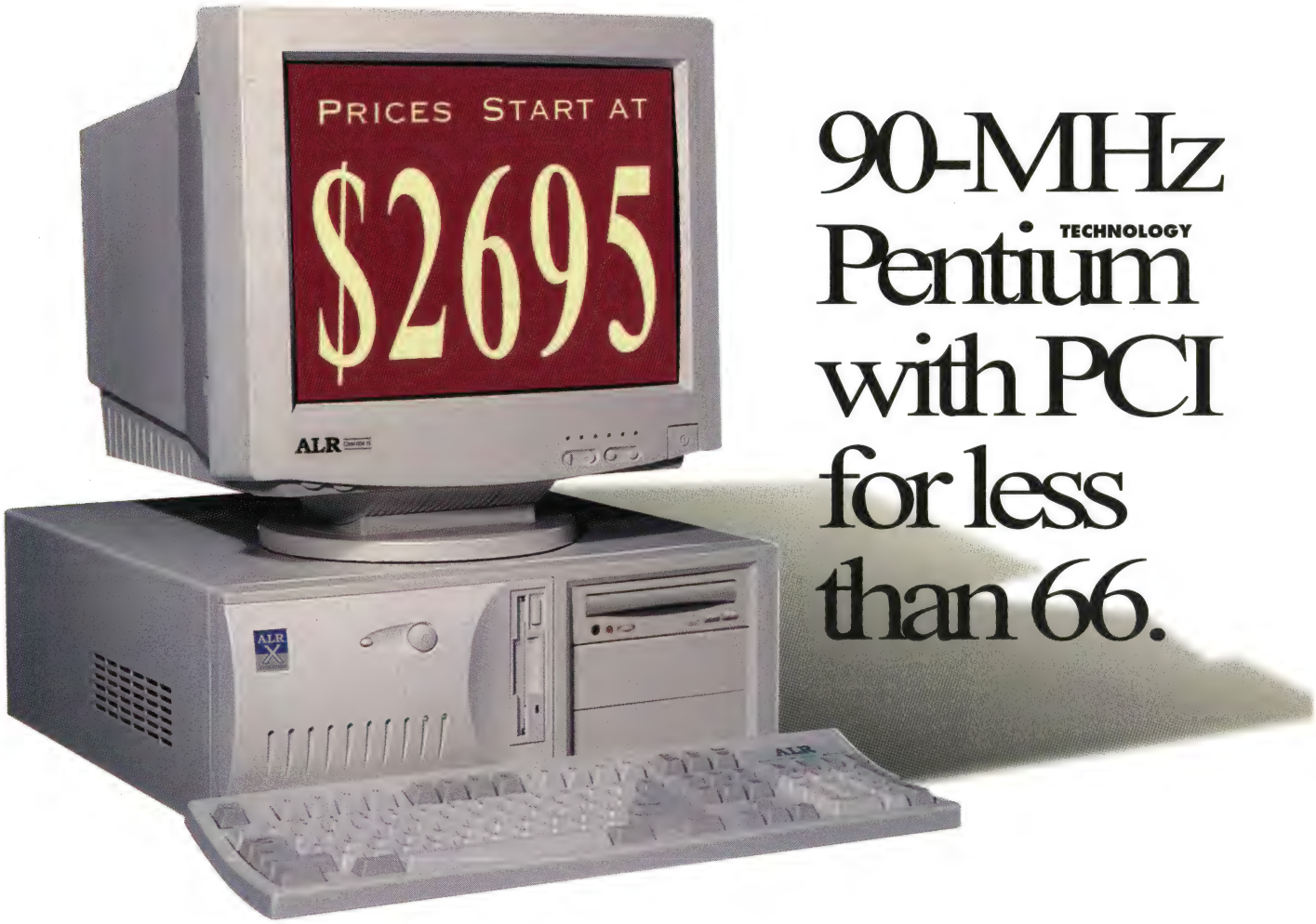
**I use it to make calls, send faxes, and respond to Lotus cc:Mail. The convenience of using one small device (at 18 ounces, about the size and weight of a first-generation cellular phone) for all my communications needs outweighs some of Simon's awkwardness—such as its tiny 4½-by-1½-inch touch screen and software-only keyboard.**

**To make Simon useful for storing telephone numbers, faxes, sketches, notes, calendars, electronic-mail messages, and to-do lists, you need a PCMCIA memory card, which fits into Simon's Type II slot. Bell South Mobility, 800/746-6672.**

**Reader service no. 748**

**—Joe Abernathy**

LEFT: JOHN GREENLEIGH; ABOVE: GORDON STUDER




# 90-MHz Pentium TECHNOLOGY with PCI for less than 66.

Of course 66-MHz Pentium processor systems are fast. But why settle for one of those when you can get a 90-MHz ALR EVOLUTION X for less?

## INTRODUCING THE ALR EVOLUTION X/90

10 YEARS 1984–1994 — A Leader in PC Design Innovations

*ALR continues to set the standard in PC technology.*

Loaded with performance, features, and value, the ALR EVOLUTION X/90 is the perfect way to celebrate ALR's ten year anniversary. Boasting a next generation Intel® Pentium™ microprocessor and our own optimized motherboard design, it easily outpaces other 90-MHz systems while outperforming 60-MHz PCs by *more than* 40%. Just check out the comparison chart below.

Boosting overall performance even more, the EVOLUTION X also includes a fast PCI local bus. And with its 64-bit Super VGA graphics, it delivers a full range of colors at Warp 10 speed.

But even though this is a thoroughly 90s system, it's still packed with plenty of old fashioned value. A Mode 3 Enhanced IDE disk interface (integrated right onto the local bus) gives you SCSI-like performance at an affordable IDE price. Six drive bays and eight expansion slots provide plenty of room for future growth. And hard drive models even come standard with a CD-ROM drive, so you can check out all that new software.

We've also backed the EVOLUTION X/90 with our exclusive five year/fifteen month warranty and one year of free on-site service*. Factor in our highly rated technical support, and it's a service and support program that would be a hit in any decade.

5 YEAR 15 MONTH warranty

Sure, the sixties were fun, but now its time for the nineties. To learn more about today's best performing value, visit your local ALR reseller, or call:

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intel inside pentium PROCESSOR

*The Intel® iCOMP™ Index is an easy-to-understand rating reflecting the relative performance of Intel microprocessors.

Higher rating represents higher performance.

| ALR EVOLUTION X/90 | Compaq® Deskpro™ XL 566 |
|---|---|
| **90-MHz** Pentium CPU | 66-MHz Pentium CPU |
| **735** iComp Score* | 567 iComp Score |
| 8-MB RAM **exp. to 264-MB** | 8-MB RAM exp. to 136-MB |
| PCI local bus | PCI Local Bus |
| 64-bit Local Bus Video | 64-bit Local Bus Video |
| DOS, Windows, Mouse | DOS, WIndows, Mouse |
| **2X CD-ROM Drive** | Not Included |
| **1-Gigabyte Hard Drive** | 535-MB Hard Drive |
| **$3,395** | **$3,874** |

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**Circle 10 on reader service card**

# pcAnywhere 2.0: Easy Links From Home to Work

TEST DRIVE

Many of us would rather work at home—at least part of the time—and some of us have no choice but to bring work home. Unfortunately, the technology that allows PC users to telecommute is at best unreliable. Typically, remote-control software is tricky to install and use—and it can be painfully slow when running graphics-laden Windows applications.

Norton pcAnywhere 2.0 for Windows, Symantec's newest remote-computing program, masks most of the arcane technical details of linking two PCs via modem or network. During installation, the software automatically locates and determines the speed of your modem. It also makes few modifications to your Windows setup; for instance, pcAnywhere uses existing video, keyboard, and mouse drivers as specified in Windows' SYSTEM.INI file.

Symantec deserves kudos for keeping the program's interface very simple. Four large icons below the menu bar provide easy access to common tasks: A single mouse click lets you call a remote PC or an online service, receive a call from a remote PC, or exit the program.

pcAnywhere 2.0's easy-to-use file-transfer utility is among its best-designed features. At anytime during a remote session, you can click a button on the program's single drop-down menu to access the file-transfer tool. Featuring a split-screen interface that resembles Windows' File Manager, this utility lets you drag-and-drop a file to another PC. pcAnywhere also has a file synchronization tool.

We found pcAnywhere faster than Norton-Lambert's CloseUp 6.0 (see the September issue, page 61) at file transfers. CloseUp took almost 2 minutes longer to transfer a 2MB database file than pcAnywhere.

pcAnywhere's remote-access feature lets you log directly into the LAN as a network node.

No remote-computing program would be complete without a raft of security features, and pcAnywhere 2.0 doesn't disappoint. If you're ready to telecommute, this $199 remote package is worth a look.

—Jeff Bertolucci

### Norton pcAnywhere 2.0 for Windows

**Easy-to-use remote-computing package.**

**Key Features:** Simple setup • Remote-control and remote-access capabilities • Impressive security features

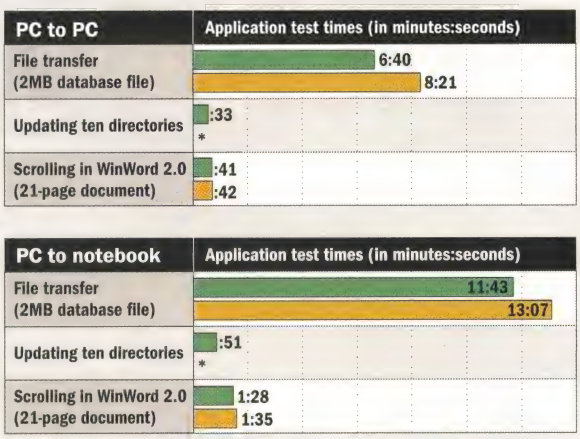
**Pricing:** $199

**Availability:** Immediate

Symantec, 800/441-7234, 503/334-6054

Reader service no. 749

### Pick pcAnywhere for Fast File Transfers




Shorter times are better. pcAnywhere for Windows CloseUp 6.0

*CloseUp 6.0 does not support automatic directory updating.

**Methodology** The PC-to-PC tests used one DX4-100 PC with 8MB RAM as a host and a similar PC as a guest. The PC-to-notebook tests used one DX4-100 PC with 8MB RAM as a host and a 486-33 notebook with 4MB RAM as a guest. All systems used 16550 UARTs and 14.4-kbps fax-modems. Connections were within 12 feet.

PC World Test Center application benchmarks.

## 24-Hour Battery Life:

**Notebook users who struggle to eke 2 to 3 hours of power out of a battery charge may do a double take when they hear about the Aer Air Energy Power 220, a new battery based on zinc air technology. Manufacturer Aer Energy Resources claims its batteries provide notebooks with 20 to 30 hours of life on a single charge. Right now, even the best notebook batteries peter out after 6 to 7 hours. One other bonus: The Power 220 includes a jack to provide simultaneous power to a cellular phone.**

**The Power 220 has its compromises. First, it weighs as much as most notebooks—about 6 pounds. And it's not cheap: An external unit, which includes adapters that allow it to work with 80 to 90 percent of notebooks on the market, is $649.**

**Aer is working with Zenith Data Systems and other notebook vendors to develop smaller zinc air batteries that could replace the nickel–metal-hydride (NiMH) and nickel-cadmium (NiCd) batteries used in most notes. Zinc air batteries achieve long life through unique technology: While most batteries contain an oxidizing agent to stimulate a chemical reaction, zinc air draws oxygen from the air for that purpose. Zinc air batteries don't suffer from the memory effect that can limit battery life; on the downside, they take 50 percent longer to recharge than NiCds and NiMHs. Aer Energy Resources, 404/433-2127. Reader service no. 750**

JOHN GREENLEIGH

# 66-MHz 486DX2 for less than $1000.

## INTRODUCING THE ALR EXPRESS VL 4/66D

Let's face it, to make the most out of today's average business application you need more than just an average PC. You need fast processing, high-speed disk access, and windows busting local bus graphics. In short, you need the ALR Express VL 4/66d.

Powered by a fast 66-MHz 486DX2 class processor and sporting performance boosting local bus technology, the ALR Express VL 4/66d kicks all of your applications into high gear. With its performance boosting 128-KB write-back cache, it offers the power of a high-end business system at the price of a home office PC. In fact, you can purchase an ALR Express VL 4/66d for as little as $945 SRP. You can even get a fully configured model (including a 214MB hard drive, DOS, and Windows) for under $1,300.

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*ALR continues to set the standard in PC technology.*

**Digital Wave Express Multimedia Kit**

STARTING AT $349SRP

- Double speed CD-ROM Drive
- Advanced 16-bit Stereo Sound Card
- Microsoft Home Titles
- Installation Video
- Speakers

With accelerated Super VGA graphics integrated right onto the local bus, the Express VL is perfect for desktop publishing, presentation graphics, and other demanding Windows applications. It even makes a great multimedia system. Just add an ALR Digital Wave Express multimedia kit. For superior disk performance, the local bus also contains a Mode 3 Enhanced IDE hard disk controller. This high speed disk subsystem is even compatible with the ALR IDE CD-ROM drive, so you can add a CD-ROM drive to the Express VL without losing an expansion slot.

Planning on expanding your network? The Express VL's built-in security features make it an excellent network node. And with its integrated power management features, this lean, mean, business machine can put a dent in your electric bill while helping to promote a cleaner environment.

Best of all, the Express VL 4/66d is as close as your local ALR reseller. So why deny yourself the performance of a 66-MHz 486 PC any longer? For the reseller nearest you, call:

**1-800-444-4ALR**

Other processors and models available; call for details

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Systems shown with optional CD-ROM drive, monitor and equipment. Prices, specifications and configurations are subject to change without notice. Prices based on U.S. dollars. ALR is a registered trademark of Advanced Logic Research, Inc. Pentium logo and Intel inside logos are trademarks of Intel Corporation. All other brand and product names are trademarks or registered trademarks of their respective owners. ©1994 by ALR

**Circle 9 on reader service card**

# Quicken Manages Finances for Novices and Experts

**TEST DRIVE**

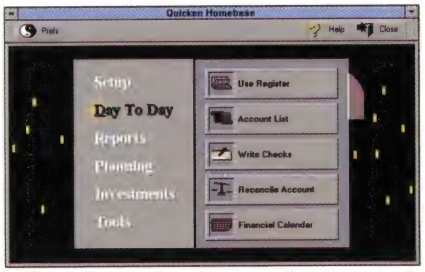
How do you meet the demands of experienced Quicken users for more features, yet still keep this premier bill payment and financial management program easy enough for a beginner? That's the challenge that faced Quicken developer Intuit, which handled the job elegantly by developing separate versions for these two very different groups.

While both products share a core set of functions and include new, easier navigational tools, your decision on which to purchase will probably come down to your financial expertise and the intricacies of your finances. Novices, and those whose financial gymnastics don't range much beyond bill paying, will want to opt for the standard Quicken 4 for Windows version. If you're running with the bulls on Wall Street, or you need to catalog your various furnishings and art collections, then the Quicken Deluxe 4 for Windows version is your best choice. It includes supplemental software that tracks assets, such as investments and household effects, and helps you better plan for income tax time.

To make an increasingly complex package easier to use, Intuit developed an alternative menu system called Homebase, available in both the standard and deluxe products. This pop-up menu provides quick access to key functions, such as reports, bill payment, and investments, so you don't have to wade through the unwieldy Windows drop-down menus. When you click the action you want, such as reports or setup, a list of available functions pops up right beside it. Using this feature in the beta versions of both products was a breeze.

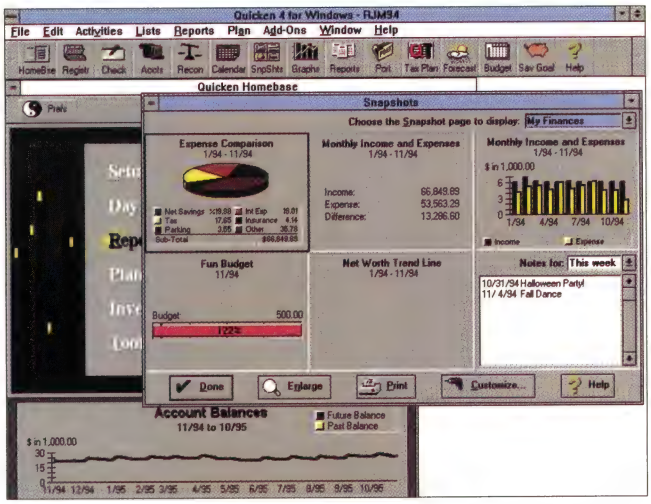
Even Quicken veterans will like Snapshots, a half-dozen graphs that display key indicators of fiscal health. You can modify the selection to see only the charts you consider most important. It's like having a mini executive information system for your personal finances.

As a veteran user, I particularly appreciate the new *super-categories*, which enable you to combine categories and make the preparation of such things as budgets far easier. For instance, you can establish a vehicle expense super-category to keep track of your spending on gas, repairs, maintenance, and insurance.




**Quicken's Homebase makes it easier to select from related groups of functions.**

Quicken's deluxe version includes everything in the standard program plus applications such as Home Inventory, a household-possession tracker formerly available in Quicken Companion. You also get a booklet of tips and tricks that reveals how to use Quicken for all sorts of arcane purposes, such as tracking your compact disk collection and recording frequent-flier air miles. Is there anything Quicken *doesn't* do?




**Quicken's Snapshots give an instant picture of your fiscal health.**

Active investors will appreciate Quicken Quotes, which lets you download each day's securities prices and trading volumes from CompuServe—all you need is a modem to dial the dollar-a-minute 900 line. If you use Quotes regularly, however, it's more economical to get your own CompuServe account.

Also new in Quicken Deluxe is Tradeline, a stock guide that lets you review price trends in stock charts. If you subscribe to the service, you receive floppy disks with regular updates.

Quicken's beefed-up investment functions almost equal Meca's Managing Your Money. However, I find Meca's more integrated approach to investments easier.

Both versions of Quicken are available on either floppy disk or CD-ROM for the same price. The CD-ROM edition includes on-screen manuals and multimedia help, in which lively videos of Quicken employees guide you through the product. The engaging videos show people walking and pointing their way through the program's features. The deluxe CD-ROM also includes video advice from financial experts Jane Bryant Quinn and Marshall Loeb.

Whether you're a financial first-timer or a pecuniary professional, there's something for you in one of the two Quickens.

**—Richard Morochove**

## Quicken 4 for Windows, Quicken Deluxe 4 for Windows

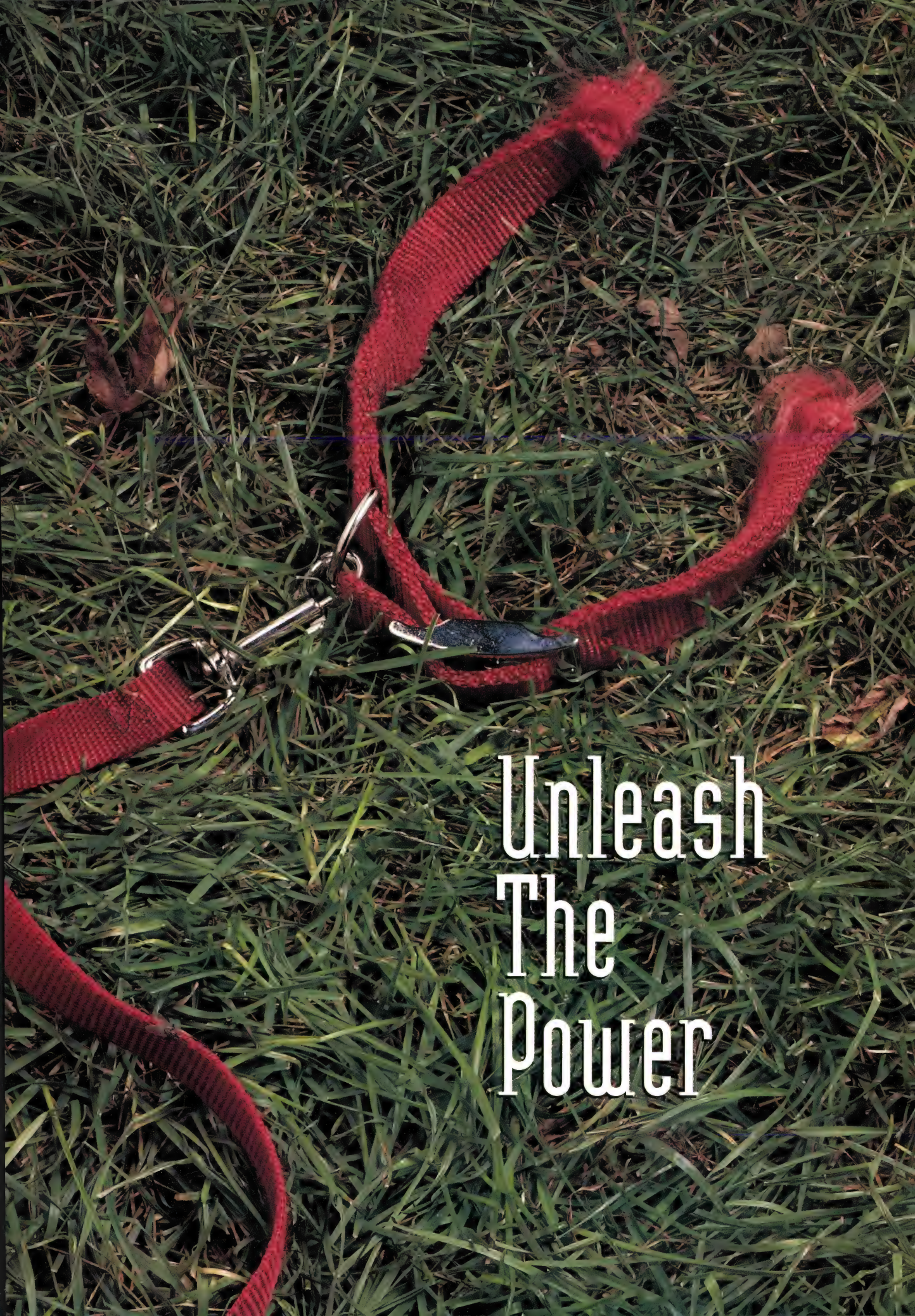
**Keep track of your expenses and investments with this personal finance package.**

**Key Features:** **You can pay bills with checks or electronically • Track budgeted versus actual expenses • Monitor securities prices and trends**

**Pricing:** **Quicken 4 for Windows $39.99, Quicken Deluxe 4 for Windows $59.99**

**Availability:** **Immediate**

**Intuit, 800/624-8742, 415/322-0573**


Unleash
The
Power

*48-Hour QuickShip program applies only to the ColorBook 4SX-33 configuration. Your PC will be delivered to you within two business days from the time of order. No additions or deletions can be made to the configuration. Available for approved credit card orders only. Domestic U.S. orders only. © 1994 Gateway 2000, Inc. Gateway 2000, HandBook, black-and-white spot design, "G" logo and "You've got a friend in the business" slogan are registered trademarks, and ColorBook, EZ Point and TelePath are trademarks of Gateway 2000, Inc. The Intel Inside Logo and Intel are trademarks or registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping or applicable sales tax.

It Sizzles!

Best Buy Awards
ColorBook DX2-50, PC World, July '94
ColorBook DX4-75, PC World, August '94
Only Color Portable With Microsoft Office Professional Software Included!

Hot Deal!!
$999
HandBook 486SX-33
With 130 MB Hard Drive.
World's Smallest Windows PC.
Only 2.9 lbs.

# ...When You're On The Fly

I'm just not ready to be chained down to one master! I gotta find wings to soar with the eagles! Fly with the basset hounds! All I really need is a Gateway 2000® HandBook® 486 to take with me when I'm on the loose. The HandBook 486SX-33 will set me free with a 130MB hard drive and Microsoft Works™ for a unbelievable $999! That's a hot deal that has all the dogs barking.

Fifi will love it, too! I can howl outside her kennel while I modem reminders to my owner to refill my food bowl. The HandBook measures only 10 by 6 inches, small enough for me to carry when I'm chasing down fire trucks.

My master has to understand: I can't stay tied to a fence post all day. I'm a busy dog! Maybe if I explain it to him with pictures. A ColorBook™ from Gateway 2000 will make him sit up and take notice. Even though *I'm* colorblind, I can show *him* brilliant color and desktop performance with prices as low as a basset hound's belly.

Gateway has the selection I need, too, from the popular $1,999 486SX-33 to the power-packed DX4-75, one of the fastest 486 notebooks available today. The DX4-75 even has a 10.4-inch dual-scan display, the biggest most affordable screen in the entire canine world. Don't go barkin' up the wrong tree. Call a friendly Gateway 2000 sales representative for your perfect portable PC!

intel inside

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*Intel Verified: Upgradable

800-846-2030

# A Doggone Good Value!

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- 2.94 Lbs., 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 or DX2 Processor
- External 3.5" Diskette Drive
- 7.9" Backlit VGA Display
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- 1 PCMCIA Type II Slot
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### HANDBOOK 486SX-33

4MB RAM, 130MB Hard Drive, Case, MS Works

**$999**

*(w/ 250MB HD)* **$1499**

### HANDBOOK DX2-40

8MB RAM, 130MB Hard Drive, Case, MS Works

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### HANDBOOK DX2-50

***More MIPs per pound than any other subnotebook.***

8MB RAM, 250MB Hard Drive, Case, MS Office Professional

**$2299** ***New Low Price!***

## COLORBOOK™

- 5.7 Lbs., 11.7" x 8.5" x 1.77" SL Enhanced Intel 486, DX2 or DX4 Processor
- 4MB or 8MB RAM (Expandable to 20MB)
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- STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots (1 Type III)
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial, PS/2 & VGA Ports
- MS Works 3.0 or MS Office Professional
- MS-DOS 6.22 & WFW 3.11
- Cool Carrying Case

### COLORBOOK 486SX-33

***48-Hour QuickShip Guarantee.***

4MB RAM, 250MB HD, Case, MS Works, 9.4" LCD

***Now with Fax/Modem!***

**$1999**

### COLORBOOK DX2-40

4MB RAM, 250MB HD, Fax/Modem, Case, MS Works, 10.4" LCD

**$2599**

### COLORBOOK DX2-50

8MB RAM, 340MB HD, 96/24 Fax/Modem Case, 10.4" LCD

**$3199** ***MS Office Professional!***

### COLORBOOK DX4-75

**PC World's *Best Buy Award August '94!***

8MB RAM, 340MB HD, TelePath™14.4 Fax/Modem, Case, MS Office Professional, 10.4" LCD

**$3699**

## OPTIONS FOR THE HANDBOOK 486

- Extra 2.2Ah NiMH Batteries **$89** Each
- Citizen PN48 Portable Printer **$229**
- 4MB RAM Upgrade **$249**
- Extended VIP Warranty. We'll ship a replacement notebook within 24 hours during the warranty period. Must be purchased at point of sale. **$100**

***PCMCIA Cards***

- TelePath 14.4 Fax/Modem. **$249**
- 96/24 Fax/Modem. **$149**
- VGA Adapter. **$229**
- External Tape Backup Unit. **$295**
- Ethernet Adapter. **$149**
- Token Ring Adapter. **$449**

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# DEC Celebris PCs Offer Upgrading Ease and Snappy 64-Bit Graphics

With its new Celebris line of desktop PCs, Digital Equipment Corporation has finally embraced the latest industry trend: using product names that sound like consumer appliances instead of scientific devices. But the improvements go beyond marketing. These PCs, targeted at power users, offer the latest CPUs, 64-bit graphics, and—to make it easier to add peripherals—Plug and Play capabilities.

The Celebris lineup includes Energy Star–compliant PCI-bus PCs equipped with Intel's 66-MHz 486DX2, 100-MHz DX4, and 60-MHz Pentium processors and two models that use the 90-MHz Pentium chip. Standard equipment on all base systems includes 8MB of RAM (expandable to 128MB), 256K of secondary cache memory, a 270MB hard disk, a 3½-inch floppy drive, and integrated local bus graphics based on S3's 64-bit 864 chip with 1MB of RAM. You also get DOS 6.22, Windows for Workgroups 3.11, Diagsoft's QAPlus diagnostics, and a Logitech mouse.

### Easy to Upgrade

Most Celebris models come in slimline cases that hold one ISA slot, one PCI slot, and one hybrid slot that takes cards of either type, along with two internal drive bays and one externally accessible bay. The one exception is the top-of-the-line Celebris FP 590, a 90-MHz Pentium unit housed in a full-profile case with two additional ISA slots and another externally accessible bay.

All of the Celebris machines are built around a new Phoenix BIOS that supports the Plug and Play standard. One of the central features of the upcoming Windows 4.0, Plug and Play will let users add compliant expansion cards without having to worry about jumpers, IRQ settings, and other technical details that can make installing options a nerve-racking experience.

Plug and Play should grow in importance once Windows 4.0 appears and compliant cards become commonplace. For now, the Celebris PCs also include an ISA configuration utility, which simplifies the installation of ordinary ISA cards by automatically allocating interrupts, I/O ports, and the like. It's not true Plug and Play—you may still have to set a jumper or two on your cards—but it's a big step in the right direction.

### 64-Bit Performance

I put a preproduction Celebris 590 through its paces by running WordPerfect 6.0 and Micrografx Charisma 4.0, two resource-hungry Windows applications. The Pentium-based unit handled both beautifully, and the advantages of 64-bit graphics were particularly apparent in the nearly instantaneous updates of complex images. Performance was initially hindered by the way the system powered down the hard drive to conserve power, but it was easy to switch to a faster (if less energy-efficient) setting.

While removing a PC's case isn't usually something to look forward to, opening up the Celebris was a quick job that did not even require a screwdriver. The right and left sides of the case sport earlike, folding handles; pull them out and twist them toward you, and the top of the case pops off.

Inside, the Celebris 590 displayed the neatly organized layout and sturdy construction typical of Digital PCs. Of course, the compact slimline case doesn't provide a huge amount of space for expansion, so these aren't machines for users who plan to stuff a PC with lots of peripherals. The full-profile FP 590 model is roomier but still offers only a moderate number of slots and drive bays.

### Price Considerations

Digital has never been known for low prices, and the company isn't likely to break any price/performance records with these models, particularly when you consider that the base configurations don't include a monitor. List prices, which were tentative at press time, begin at $1949 for the 66-MHz 486-based 466 model and range to $2799 for the 90-MHz Pentium FP 590 unit. However, when weighing how much PC you get for your peso, remember that the systems include a three-year warranty—with service provided by Digital's large, well-regarded field network.

**—Harry McCracken**

**CELEBRIS CELEBRATION: Digital's newest line of PCs features easy-to-open cases, Plug and Play compatibility, and high-powered processors.**

### Digital Celebris PCs

**New line offers Plug and Play, 90-MHz Pentium CPUs, and 64-bit graphics.**

**Digital Equipment Corp.**
**800/722-9332,**
**800/524-5694 (fax)**
**List price: $1949 to $2799**
**Reader service no. 679**

# Xerox, HP, and QMS Deliver Fast, Affordable Color Lasers

For the first time, color printing has become affordable and practical enough for widespread use on everyday business documents. Xerox, Hewlett-Packard, and QMS have made a breakthrough with a new breed of networkable color laser printer. These devices use plain paper, print at high speeds, and offer a low cost per page. Until now, no color printer delivered all that.

High-end color printers that rely on dye sublimation and thermal wax technologies are still best for graphics professionals, but expensive ink makes these printers too costly for general business use. Color ink jet printers are too slow for use on a network and require expensive special paper for best results.

I tested the Xerox 4900, Hewlett-Packard HP Color LaserJet, and QMS magicolor color lasers. All three printers attach to common networks using optional interface cards.

**THE QMS MAGICOLOR provides good-looking 600-dpi output but carries a high price tag.**

### Xerox 4900: Best Output

At a list price of $8495 (estimated street price $7900 to $8100), the Xerox 4900 is the fastest of the three lasers and produces the best-looking pages. This printer can handle your most critical documents.

The Xerox includes 12MB of RAM, for 600-by-300-dpi resolution in color and 1200 by 300 in monochrome. For an additional $949, a unit with 24MB of RAM supports 1200 by 300 in color. This is the unit I tested. The 4900 includes Adobe PostScript Level II and PCL 5 emulation.

The Xerox prints at a rated speed of 12 ppm for monochrome, 6 ppm for text pages with a highlight color, 3 ppm for typical four-color pages, and 1.5 ppm for color transparencies.

However, the Xerox's cost per page is among the highest. A typical monochrome page costs 4 cents; a text page with a highlight color, 10 cents; and a page with 20 percent color coverage (for example a text page with several graphics), 24 cents.

### HP Color LaserJet: The Economical Option

If cost is your main concern, consider the HP Color LaserJet. It can handle newsletter pages, charts, and graphics well, although it cannot match the Xerox on scanned images.

The Color LaserJet lists for $7295 with 8MB of RAM. According to Angèle Boyd, a printer analyst at market research firm International Data Corporation, it could sell for as little as $5800. Hewlett-Packard delivers the low price by including Enhanced PCL 5 with color support. (For $1100 more, you get Adobe PostScript Level II with 4MB of RAM.)

The HP also delivers the lowest cost per page, averaging about half as much as the Xerox or QMS. It prints monochrome at a rated speed of 10 ppm and typical color at 2 to 5 ppm.

On the downside, it provides only 300-by-300-dpi resolution for color and monochrome output. Color graphics look good, but photos are grainy and show dot patterns.

**XEROX'S 4900 COLOR LASER makes the grade for any business document, with resolutions up to 1200 by 300 dpi.**

### QMS Magicolor Laser Printer: High Costs, Weak Warranty

The QMS magicolor numbers more cons than pros. Its output looks as good as the HP's, but with an estimated street price of $10,999, the QMS is the most expensive unit. The printer includes 28MB of RAM, for 600 by 600 resolution in both color and monochrome. QMS bundles PostScript Level II and PCL 5 with color support. The QMS costs you more per page than the HP does, but less than the Xerox on heavily saturated color pages.

While the QMS's color print speeds are close to the HP's, its 8-ppm rating for monochrome is the slowest of the group. QMS's 90-day return-to-depot warranty is inferior—Hewlett-Packard and Xerox include one-year on-site warranties.

**—Laurianne McLaughlin**

### Xerox 4900

**Fast print speeds and top-notch output.**
**Xerox Corp.**
**800/275-9376, ext. 4900**
**List price: Starts at $8495**
**Reader service no. 680**

### HP Color LaserJet

**300-dpi color laser offers a low price, low cost per page, and good-looking output.**
**Hewlett-Packard**
**800/752-0900**
**List price: Starts at $7295**
**Reader service no. 681**

### QMS magicolor

**Pricey 600-dpi color laser offers decent output but prints monochrome slowly.**
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**800/523-2696**
**Estimated street price: $10,999**
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# NEC's New MultiSync Monitors Are First With Plug and Play

Everybody's talking about Plug and Play, but nobody seems to be doing much about it. That's what makes NEC's new MultiSync XE and XP monitors notable: They're the first monitors we've seen that support Plug and Play.

When it comes to monitors, Plug and Play can mean two different things. First, it means your monitor is able to tell your system which resolutions and refresh rates it supports. Both the lower-end XE series and the more sophisticated XP monitors support the first form of Plug and Play.

In its second sense, Plug and Play for monitors means bi-directional communications between monitor and system—not just monitor to system, but system to monitor as well. This means you can adjust on-screen images from your keyboard or mouse. The XP monitors offer this second form of Plug and Play via a special connection called the Access.bus. This port provides a channel through which control signals can travel from PC to monitor. (Video signals will still travel via a separate cable from your graphics adapter.)

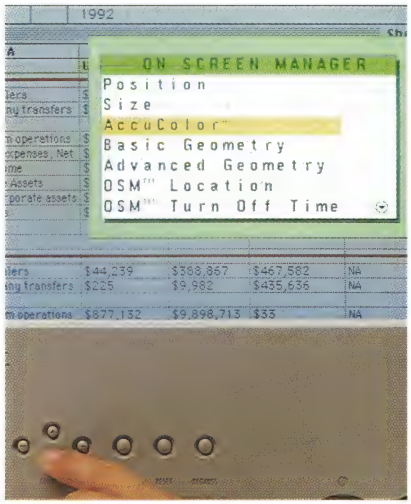
The one hitch with both forms of Plug and Play is that your monitor can't do it alone. The requisite hardware and software may not be available this year.

Even without Plug and Play, these are nice monitors. The XE and XP monitors ship with excellent on-screen controls. These monitors have a graphical interface that puts the static, menu-driven on-screen controls from other vendors to shame. The NECs sustain the high refresh rates and resolutions you'd expect from premium displays.

—Dan Miller

**NEC MultiSync X-series**

**Plug and Play monitors.**
**NEC**
**800/632-4636**
**Estimated street price range:**
**$575 to $2580**
**Reader service no. 683**




**IN ADDITION TO PLUG AND PLAY support, the NEC X monitors offer high performance.**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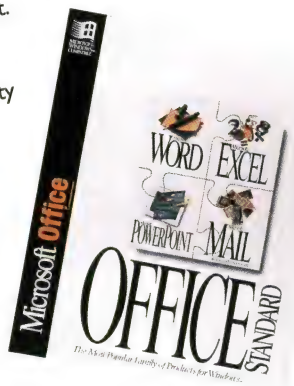


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# Brother's Bargain-Basement Laser Printer Costs Just $399

Brother International has ushered in the lowest-priced laser printer to date. The HL-630 is a 6-page-per-minute (ppm), 300-dot-per-inch (dpi) printer that's street-priced around $399. By comparison, the leading 300-dpi laser, Hewlett-Packard's LaserJet 4L, sells for about $599. If you want a low-cost laser for your home or small office, the HL-630 is a very affordable option. But before you buy, think carefully about your printing needs.

**Brother HL-630**

**The first 300-dpi laser printer for under $400.**

**Brother Int'l**

**800/276-7746**

**Estimated street price: $399**

**Reader service no. 684**

The HL-630's 6-ppm print speed tops that of most 300-dpi lasers (including the LaserJet 4L), which typically offer 4-ppm performance. The Brother printer uses a 16-MHz Motorola 68000 processor, 512K of RAM, and PCL 4 emulation. (The LaserJet 4L has the same processor but includes 1MB of RAM, PCL 5 emulation, and HP's resolution enhancement technology.) The same printer with 1MB of RAM sells for $499 on the street.

The HL-630 uses a straight paper path, which helps prevent paper jams and lets you print on a variety of paper stock—from 3-by-5-inch cards to legal-size paper. And its input tray holds 200 sheets—twice as many as the LaserJet 4L's. But like most low-end 300-dpi lasers, the HL-630 can't be upgraded to PostScript.

Also on the downside: When I tested the HL-630, its graphics quality was often mediocre. On a newsletter page, a photo appeared grainy, and text inside a shadow box was jagged. As expected, plain text and large fonts looked good.

But the critical question is, Do you really need a laser printer for your home or small office? For $499 you can buy a color ink jet such as Canon's BJC-4000, which offers 720-by-360 resolution and 5-ppm speed in monochrome mode, and 360-dpi color output. Or you can save money with a monochrome ink jet such as Canon's $250 BJ-200e, which prints 360-dpi text at 4 ppm.

The output from today's best ink jet printers looks so good, it's hard to distinguish from laser-printed pages—except in the minute details on graphics. The HL-630's advantages are a slightly faster print speed and a slightly lower cost per page. According to Brother, a typical HL-630 text page costs 2.4 cents, or just under 2 cents in economy mode. By comparison, an ink jet page costs between 3 and 5 cents (1.5 to 2.5 cents in draft mode).

**—Laurianne McLaughlin**


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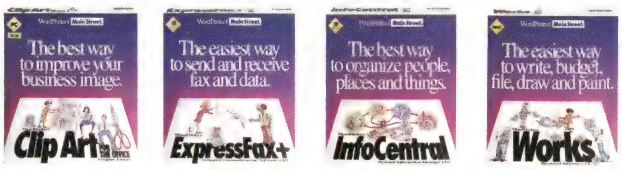


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# Lotus SmartSuite 3.0 Gets Smarter With Improved Integration

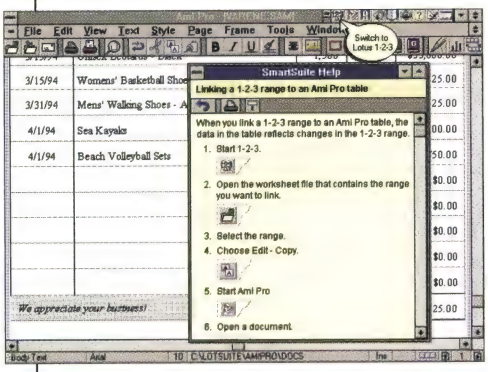
It's not surprising that software suites account for the lion's share of software sales. They provide the most bang for the buck and promise smooth integration among applications. Lotus's latest offering, SmartSuite 3.0, delivers in both areas. Besides an initial $299 price tag, you'll find improved support for Lotus Notes and lots of minor changes that make the programs work better together.

SmartSuite 3.0 includes major upgrades of the 1-2-3 (spreadsheet) and Approach (database) programs, and minor upgrades of Ami Pro (word processing) and Freelance Graphics (presentation graphics). The Organizer personal information manager hasn't been upgraded. A new addition is ScreenCam, Lotus's multimedia screen and sound capture utility.

Lotus has abandoned the tedious single-app installation process in favor of an integrated method that lets you install everything at once—with plenty of customization options. You can install the product on an individual workstation or a network server. In the latter case, the apps can be installed to individual nodes from the server. Those who don't relish the thought of shuffling 26 floppies may want to wait for the CD-ROM version, which should ship by the time you read this.

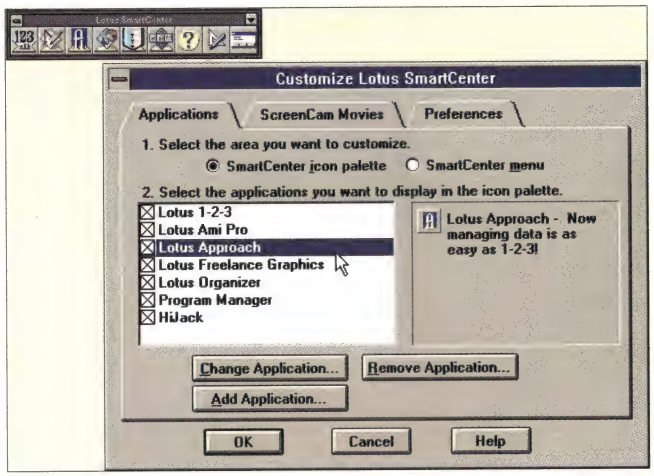
A minimal installation will eat up about 31MB of disk space—and about 87MB if you want it all. This isn't as bad as it seems, however, since the full installation includes several large ScreenCam demonstration files that you can easily delete to save disk space.

At the hub of the SmartSuite is SmartCenter—a vastly improved replacement for the previous version's clunky Lotus Application Manager. SmartCenter is an "always-on-top" icon palette that simplifies program launching and switching. By default, it includes icons for the installed suite applications—but it's easy to add icons for other apps. SmartCenter also provides quick access to a handy help file that gives step-by-step instructions for dozens of common cross-application tasks such as linking a 1-2-3 range to an Ami Pro document. And if you're the type who learns by watching, you can see many of the techniques demonstrated in ScreenCam presentations.




**NEED HELP? SmartSuite provides instructions for many cross-application tasks.**

The new versions of 1-2-3 and Approach are finally on speaking terms with each other. 1-2-3's menus now provide easy access to Approach features, including form generation, mailing labels, and dynamic cross-tabs. Approach can read 1-2-3 files, and its new worksheet view will make spreadsheet users feel right at home.




**LAUNCH PROGRAMS QUICKLY: SMARTSUITE 3.0 makes it easy to add new applications to its floating SmartCenter icon palette.**

## Common Look and Feel

The SmartSuite 3.0 applications have a common look and feel, and the overall consistency of the interfaces has improved since version 2.1. However, Organizer is still something of an oddball and doesn't fully conform to the style of the others. For example, Organizer requires that you right-click an icon to get the bubble help description, while the primary suite members (1-2-3, Approach, Ami Pro, Freelance) use the same tool bar icons (with automatic bubble help) and have similar menu structures. All of the applications have right-click shortcut menus, and their dialog boxes sport a title bar icon that summons context-sensitive help. Because of these commonalities, a user who learns one application in the suite will often find it easier to get up to speed with the others.

The concept of SmartMasters—pre-built templates that make it easier to create a new document—first appeared in Freelance Graphics. Now, all the primary applications in the suite have incorporated this idea. If you need to create an invoice in 1-2-3, for example, you can save time by using a SmartMaster template.

Except for Organizer, the suite applications support OLE 2, but you won't find the slick edit-in-place feature found in some of the Microsoft applications. (For example, you can insert a Microsoft Excel worksheet in a Word document, click on it, and Excel's menus and tool bars—rather than Word's—appear at the top of the screen.)

Even if you don't need all of SmartSuite's features and applications today, it will be nice to have them handy when you do. Any way you look at it, SmartSuite 3.0 is a good deal.

**—John Walkenbach**

### Lotus SmartSuite 3.0

**Better integration of Lotus's collection of desktop applications.**

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# IT'S LIKE YOUR FAVO JUST CAME BACK

Really, the way the Microsoft® Natural Keyboard™ fits you, it would be more accurate to ask you to try it on than to try it out.

What we have here is an entirely new kind of keyboard – a design that fits you like your most comfortable clothes. And promotes a more natural posture for comfortable computing.

But there's much more to say about this keyboard. After all, it's the result of extensive ergonomic and usability research.

We started by watching how people work, taking note of their natural body positions. How they type. And how they use Windows.™

Our findings, to be honest, were incredibly enlightening. We discovered there's a lot of room for improvement in the standard typewriter-keyboard. And that it could fit today's computer environment better than it currently does.

So we proceeded with a redesign. The result? A responsibly designed, split-keypad, gently

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# RITE PAIR OF JEANS AS A KEYBOARD.

sloping keyboard that fits more closely to the natural positions of your hands and wrists. And one that is more comfortable, if a bit odd-looking.

With this innovative new design, we were able to encourage a straighter positioning of the wrist. Which helps to relax the forearm. Which then helps to relax the shoulder. All of which makes for a more natural typing position.

*The Microsoft Natural Keyboard fits you, not the other way around.*

And then we priced the Natural Keyboard to fit your budget just as well as it fits your hands.

But we simply couldn't stop there. So we gave the keys a nice, soft touch and feel. What's more, new keys and software simplify access to the Windows operating system. Like three new Windows function keys, a simple keyboard manager and mouse cursor accelerators.

Suffice it to say, it's like nothing you've ever gotten your hands on.

To experience the Microsoft Natural Keyboard for yourself, simply pay a visit to your local computer retailer. And slip one on. You won't believe how comfortable it feels.

And you won't even have to wait for a dressing room.

**Microsoft**

deaf or hard-of-hearing can reach Microsoft text telephone (TT/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Microsoft and the Windows logo are registered trademarks and Natural Keyboard and Windows are

# Harvard Graphics 3.0 Makes Fast Work of Presentations

Ease of use" is a common buzz phrase used to describe Windows presentation software. Vendors realize that overworked businesspeople don't use their presentation software often enough to become well-versed in a program's intricacies. Instead, most users create their presentations sporadically—as infrequently as once a month or less.

While Harvard Graphics may be designed for the infrequent user, it provides powerful presentation features for experts. (Version 2.0 won a Best Buy in the April 1994 *PC World*.) Version 3.0 expands on these ease-of-use features, making Harvard Graphics an excellent choice for the busy manager.

### Help Me, Harvard

Harvard Graphics' Five-Minute Coach makes the program easy to learn and relearn. This highly motivational tutorial consists of several short lessons that provide an overview of key procedures. The Advisor, a context-sensitive help screen, provides quick design and editing tips. Simply click an icon to display the Advisor window, or leave it on screen.

In version 3.0, the Advisor and the Five-Minute Coach have been revamped to provide even more helpful hints and instructions. You'll find Quick Advice buttons in key dialog boxes that suggest what to do next—and why. For example, in the New Presentation dialog box, you can get quick advice on slide and chart types, printer output capabilities, and presentation styles.

In addition to providing design tips (such as which chart to use for your data), Harvard Graphics 3.0 also features the Design Checker. This constructive critic reviews your work and points out flaws in the layout. When it examined one of our presentations, the Design Checker noted that using only capital letters in bullet points is a poor design element. And, of course, it is.

### Power Presenter

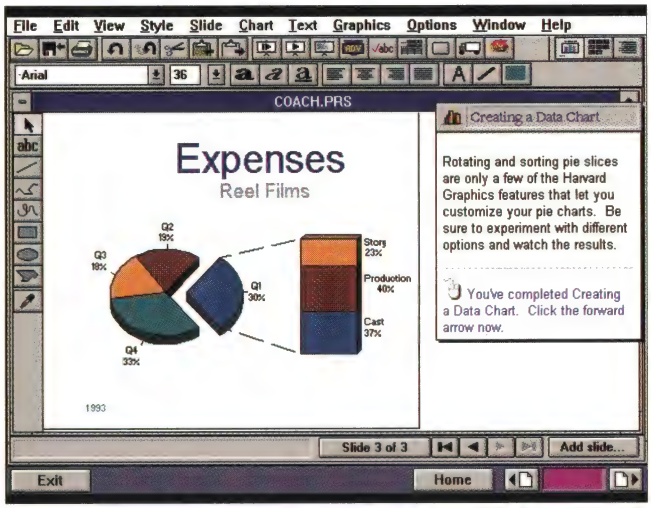
Another new feature is Quick Presentations. Similar to Microsoft PowerPoint's Pick-a-Look Wizard, Quick Presentations provides templates for specific presentations, such as a business plan, a brainstorming session, or a quarterly review. After you've chosen a template, all you do is fill in the data. Version 3.0 also provides sample data in templates and styles, so you can click a chart element (such as text or graphics) and replace the samples with your own data. (You can also customize templates.)

And you can now use the <Home>, <End>, <Page Up>, and <Page Down> keys to navigate a presentation. While this feature is common to most other presentation, layout, and graphics programs, it's new to Harvard Graphics—and a welcome addition for those who prefer using the keyboard.

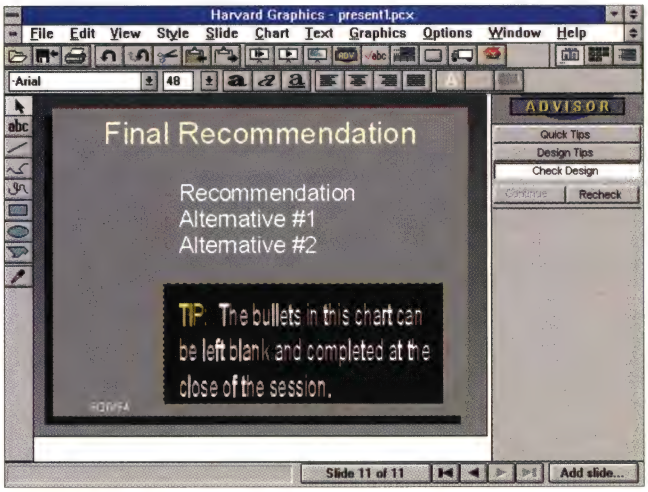
A drawback to version 2.0 was that it didn't let you edit data (such as bullet points and tables) in slide view. Instead, you had to switch back to the data sheet. But version 3.0 allows slide view editing (as do most Harvard competitors, such as PowerPoint and Lotus's Freelance Graphics).

Of course, no program is perfect. Traditionally, a major new release of Harvard Graphics brings a wealth of new and innovative features. Unfortunately, such is not the case with version 3.0. While it goes a long way to increase ease of use, this upgrade breaks no new ground; rather, it moves the program closer to the usability features that already can be found in PowerPoint 4.0. (In fact, choosing between the two packages right now is almost a toss-up.) The bottom line is that you can't go wrong with Harvard Graphics' powerful, easy-to-use presentation features.

**—Bill Harrel**




**HARVARD GRAPHICS' FIVE-MINUTE COACH is presentation boot camp for the novice or infrequent presenter.**




**THE NEW DESIGN CHECKER inspects your presentation for design and layout flaws—useful for the novice presenter.**

## Harvard Graphics 3.0 for Windows

**Powerful presentation package is easier to use.**

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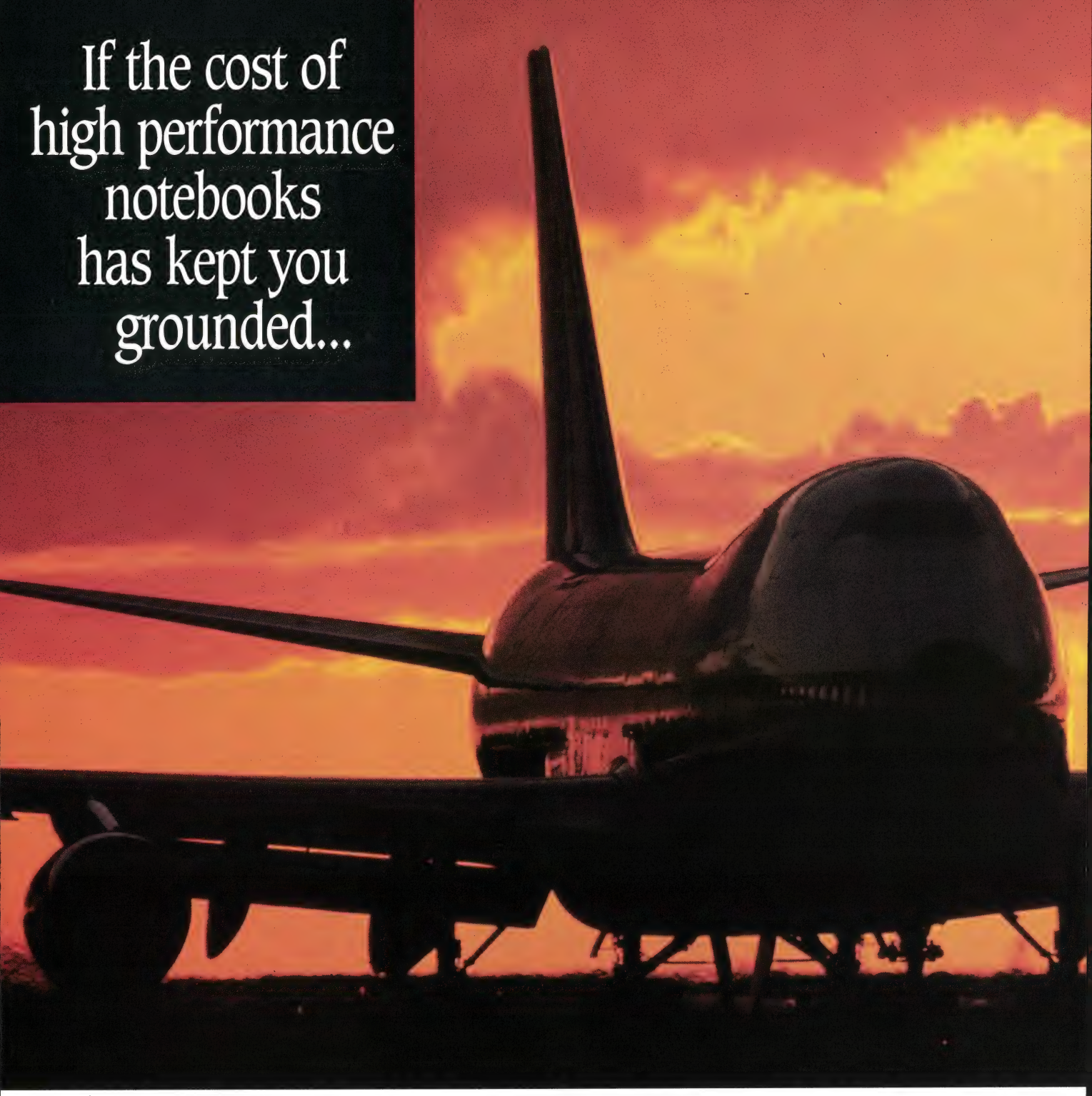


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| Battery Life: | NiMH/3 hrs. max | NiMH/2.5 hrs. max |
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**Circle 102 on reader service card**

# Day-Timer Organizer Moves from Paper to PC

If you've kept your paper-based organizer because you're uncomfortable with the look and feel of electronic PIMs, you may be ready for a change. Day-Timer Organizer uses the loose-leaf binder look of a customary paper organizer to house a sophisticated and easy-to-use Windows-based electronic scheduler.

All the tools that make the paper Day-Timer system so efficient can be found in the PC version. You get a scheduler, task list, address book, notepad, and expense recorder. You lay out your schedules with the Daily, Weekly, and Monthly Planner windows—all familiar to Day-Timer users.

But this PIM does more than mimic its paper cousin. The program's drag-and-drop operation makes it easy to plan, reschedule, edit, or cancel appointments and tasks. For example, if you want to schedule a meeting with a client, just drag the name from your address book onto the Daily Planner. When you use the drag-and-drop tool, Day-Timer creates links between related data. You can also forge links yourself. A user-defined category list helps you group tasks and schedules under common headings for quick searches—an especially useful feature.

### Day-Timer Organizer

**Popular paper-based scheduling tool comes to the PC.**
**Day-Timer Technologies**
**800/225-5005**
**List Price: $139; DOS version also available at same price; network pricing available**
**Reader service no.700**

Say, for example, that you meet a prospective client at a trade show. Back at the office, you enter the client's name and address in Day-Timer Organizer. At the Adding Address screen, you click the Category button and assign the client to the Prospect category (if you don't have that category, you can create it on the fly). Any other actions, such as phone calls, meetings, or follow-up letters, can also be scheduled and assigned to the Prospect category.

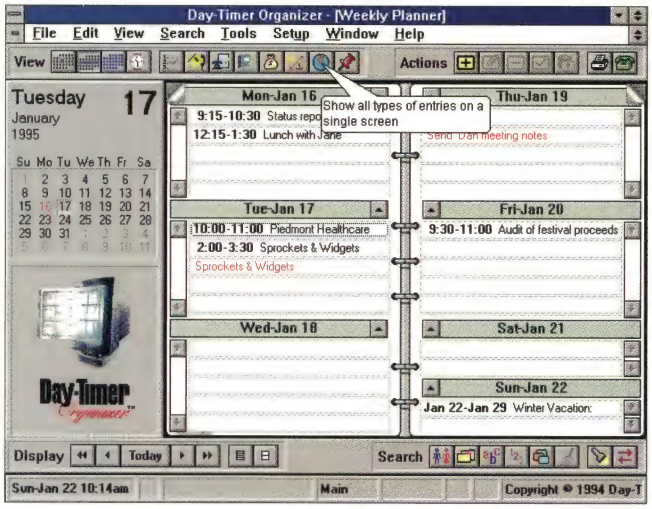
Come Monday morning, you use Day-Timer's search feature to find all data associated with the Prospect category. Since any entry can be assigned a category, it's easy to organize data in the way that works best for you—and that's the mark of a good PIM.

If only the program's Timer feature were designed half as well. Although you can keep track of time spent on various tasks (useful for billing and tax purposes), it takes too many steps to start and stop the Timer—and the feature isn't explained well enough in the Help system or in the documentation.

For users who travel without a notebook PC or electronic scheduler, Day-Timer Organizer can print information to fit most paper-based Day-Timer formats. It also prints on envelopes, labels, Rolodex-type cards, and expense reports.

When you have a personal management tool that works, there's little reason to change. Day-Timer Organizer may not win converts from other PIMs, but it offers a lot of advantages over a paper Day-Timer.

**—Peter Scisco**




**THE FAMILIAR DAY-TIMER GOES ELECTRONIC with easy-to-use features such as help balloons and drag-and-drop scheduling.**

# WinCheckIt 2.0: System Sleuth

WinCheckIt 2.0 is the personal version of Touchstone Software's Windows diagnostic utility, Check It Pro: Analyst, which is targeted at computer support professionals. The first time you launch WinCheckIt 2.0, it prompts you to select the data collection method it'll use. Click the handy Help button to get a description and frank assessment of each method. For instance, the Default method is safer but yields the least amount of system data, while the Advanced method yields more data but may hang your system.

Since WinCheckIt stores each data collection session in a separate file, you can recall old sessions and track changes to your system. Using WinCheckIt's button bar and drop-down menus, you can access data on the system's hardware configuration, CMOS setup, interrupt settings, memory map, and DOS and Windows setup.

### WinCheckIt 2.0

**A diagnostic utility for Windows PCs.**
**Touchstone Software Corp.**
**800/531-0450, 714/969-7746**
**Estimated street price: under $50**
**Reader service no. 701**

WinCheckIt's Software Shopper lists nearly 2000 programs and their hardware and operating environment requirements. Select one, click the Analyze button, and WinCheckIt checks the capabilities of your system against the needs of the program and reports potential problems. Setup Advisor provides a similar analysis of over 200 hardware devices. And the Uninstaller utility will delete an unwanted application, but not references to it in your Windows INI files.

**—Shane Rau**

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▲ Actual 720 x 720 dpi output from the EPSON Stylus COLOR Ink Jet.

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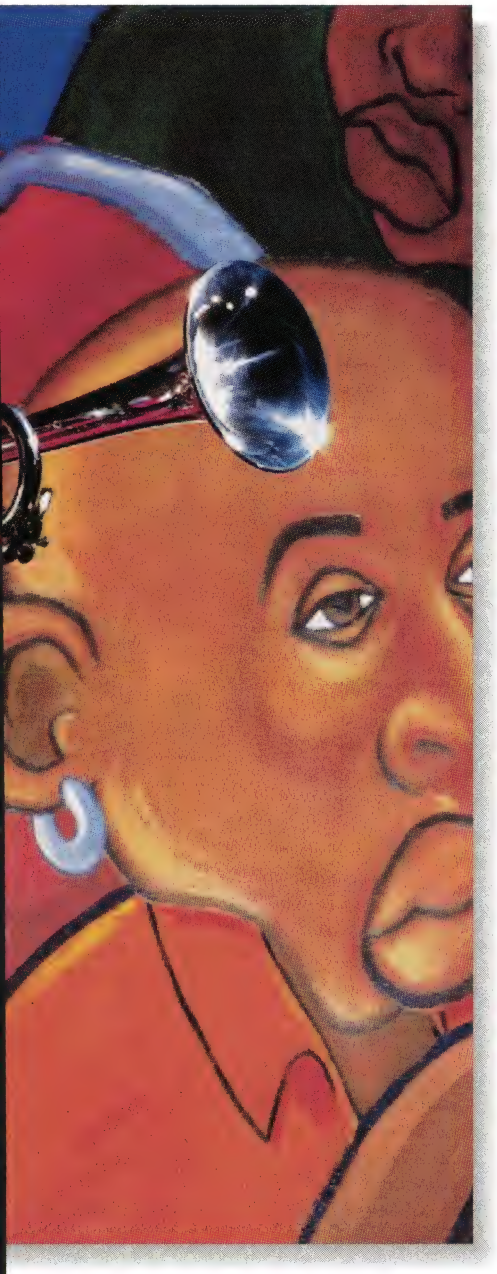

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BEST OF BYTE COMDEX Spring '94

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# The Inside Story of A.D.A.M., Eve, and the Fig Leaf

Why do you blink? What happens when you choke on food? Why do people get sick?"

If you face a daily battery of questions from a young enquiring mind—or if you still wonder about these things yourself—you'll love A.D.A.M.: The Inside Story. This interactive CD-ROM has answers about the human body and may even inspire you to ask a few anatomy questions of your own. (A.D.A.M. is an acronym for Animated Dissection of Anatomy for Medicine, in case you're wondering.)

Load the program and you'll find yourself face to face with a male figure who's nude except for a strategically placed fig leaf. That's Adam. To see his wife, Eve, just click a button.

Click anywhere on Adam's or Eve's perfect form, and a pop-up label identifies the body part. A.D.A.M.'s drop-down menus make it easy to review up to 12 body systems, including cardiovascular, digestive, and immune. As for the fig leaf—well, it's not there just for modesty's sake. You can lock it to keep the kids from exploring the sexual organs until you're ready to answer their questions. If you'd rather not answer them directly, unlock the leaf and let the youngsters explore the animations on their own.

**A.D.A.M.: The Inside Story**

**MULTIMEDIA Everything you ever wanted to know about the human body.**
**A.D.A.M. Software, Inc.**
**800/408-2326**
**List price: $79.95**
**Reader service no. 677**

A.D.A.M. is an invaluable reference that's easy to use and intelligently designed. The heart of the program is Adam and Eve's Family Scrapbook. A young (and surprisingly hip and argumentative) couple, Adam and Eve go through life blinking, getting sick or injured, and raising a family. Their explanations are loaded with bad puns, personal digs at each other, and humorous anecdotes. For instance, Eve insists that Adam tell the viewer how he choked at a party. Want more detail? You can see cutaway illustrations of the esophagus that show the path of the offending food morsel.

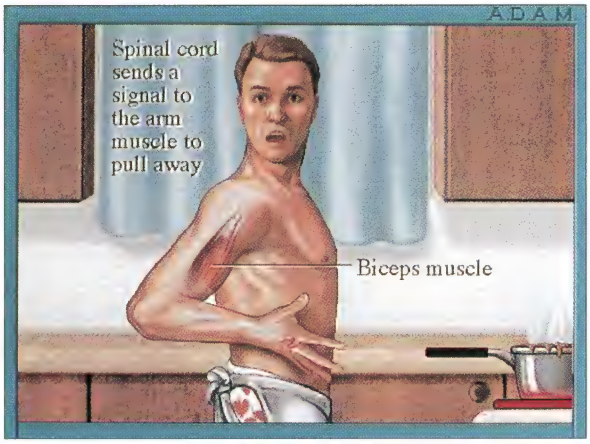
If you tire of the witty couple's instructive repartee, you can browse a list of animations. A.D.A.M. features more than 50 animations covering everything from allergies to vaccines.

Because A.D.A.M. Software has been providing anatomical and interactive computer illustrations to the medical industry for over a decade, the company has the background to make A.D.A.M. scientifically accurate.

But far from being a meaty but dry tome about medicine and anatomy, this CD-ROM is an entertaining, interactive production that gets you interested in the workings of the human body. It answers your questions thoroughly and visually—and with a humorous touch.

So don't say "I don't know, honey" when your kids ask difficult questions about health and anatomy. Park them in front of this CD-ROM, and let them figure it out for themselves—that is, after you've made the difficult decision of whether to unlock the fig leaf.

**—Christina Wood**




**TOO HOT TO HANDLE: A.D.A.M. uses full-screen animations and informative text to explain how our bodies work.**

# Eat, Drink, and Pay Dearly

To a native of San Francisco, quality food, wine, and beer are essential. But when I travel, searching for these necessities is an arduous task. Now that I use Great Restaurants, Wineries & Breweries—a multimedia culinary guide to the United States—my search is no longer in vain. The $39.95 CD-ROM lists information on more than 1400 of the country's best spots to eat and drink.

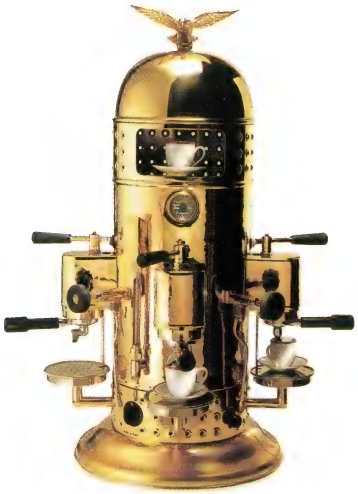
The restaurant index provides sample menus, price lists, operating hours, and dress codes. The program lets you view photos of food, restaurants, wineries, and breweries. While the restaurants include the Commander's Palace in New Orleans, Jean-Louis in Washington, D.C., and the Dining Room at the Ritz-Carlton in San Francisco, quite a few superb ones are missing, including Chez Panisse and Fleur De Lys, two nationally acclaimed San Francisco Bay Area restaurants. You do get hundreds of recipes by many of the best chefs from across the nation, however—everything from hors d'oeuvres to desserts. Some great recipes, perhaps, but I was disappointed to find that notable chefs such as Jeremiah Tower and Alice Waters are not mentioned.

You can search for and select restaurants, wineries, and breweries by city and state only; the ability to search by cuisine, price range, and neighborhood would be more helpful. But between the text and photos, this CD-ROM lets you please your palate while traveling.

**—Arden M. Hoffman**

**Great Restaurants, Wineries & Breweries**

**MULTIMEDIA Lists the nation's finest food and drink, but misses a few culinary hot spots.**
**Deep River Publishing**
**207/871-1684**
**List price: $39.95**
**Reader service no. 678**



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*Three-year limited hardware warranty. Certain restrictions and exclusions apply. **July 1994 issue.

# Print, Copy, and Fax for Less Than $1000

Hewlett-Packard has finally entered the multifunction device market with the OfficeJet: an ink jet printer, plain-paper fax machine, and copier in a single package. A good choice for small or home office, the OfficeJet is packed with neat and useful features. You can't beat the price, either; the suggested list is $950, which translates to about $800 on the street. This is one of the lowest prices we've seen for a product in this category. But the OfficeJet does have limitations, especially in the way it integrates with your PC.

The heart of the OfficeJet is the latest incarnation of HP's DeskJet printer technology. Printing at about 3 pages per minute, the printer uses the company's Resolution Enhancement Technology to give you 600 by 300 dpi and 256 grays. With a high-capacity ink cartridge, the OfficeJet will give you roughly 1000 pages of output for around $30.

The OfficeJet comes with drivers for popular applications in both Windows and DOS, not to mention 14 scalable TrueType fonts.

The fax component of the OfficeJet is packed with features found in high-end fax machines, including speed-dialing, polling, and fax broadcasting to as many as ten locations. I particularly like the delayed-send option, which allows you to scan in your fax and have the OfficeJet send it later, such as when telephone rates are lowest. In addition to standard and fine resolutions, a "photo" setting lets you send halftones.

Its 24-page memory stores incoming faxes internally if you run out of paper or if you're printing when a fax comes in. What's lacking is a way to send a fax directly from your PC. For now, you have to print out your document, then fax it manually from the OfficeJet.

The OfficeJet's "convenience copier" feature is pretty much what you'll find in most fax machines. Don't look for high-end copier quality, since copy resolution is limited to the fax scanner's 203 by 192 dpi. But it's great when you absolutely, positively need a copy or three right now. And in a pinch, the OfficeJet can produce 100 copies of an original.

Another limitation is the OfficeJet's inability to scan documents into your PC. Sure, the fax scanner's speed and limited resolution wouldn't do for production work, but many of us who don't need a full-featured desktop scanner need to do a quick-and-dirty scan occasionally: to import a graphic quickly or to save retyping by capturing a few pages of text for interpretation by optical character recognition software.

Despite its limitations, the OfficeJet is an eminently useful peripheral. Its combination of solid features and low price make it an ideal multifunction device for a small office.

**– Stan Miastkowski**

**THE VEG-O-MATIC OF PC PERIPHERALS: HP's Office Jet is a multifunction device for small offices that faxes, copies, and prints.**

### HP OfficeJet

**Great deal on integrated printer-fax-copier lacks direct PC access to scanner, fax.**
**Hewlett-Packard Company**
**800/752-0900 List price: $950**
**Reader service no. 741**

# Exchange Documents with Ease

First introduced in June of last year, Adobe's unique Acrobat is slowly becoming the ASCII of the nineties. Acrobat lets you create a PostScript document with virtually any Windows, Mac, DOS, or UNIX application and convert it to a Portable Document Format file. You can then distribute the document to others who use any of these platforms and who also have a platform-specific PDF reader. They'll see the document exactly as you created it, with layout, fonts, and graphics intact.

Acrobat 2.0 has added some interesting and useful features. Most notable is the capability to do quick full-text searches of multiple PDF files. Also new is an improved cross-document link that lets network users update documents automatically.

With version 2.0, Adobe's simplified its pricing system, though you still have plenty of options. The basic package converts simple documents, like those created with a word processor, to the PDF format. But you'll need the $595 Pro version to get the all-important Distiller, which converts more complicated documents, like PostScript files, to PDF format. For work groups, there's a $1595 ten-user version that includes the Distiller. The best news is, the basic Acrobat file reader is now free.

**–Stan Miastkowski**

### Adobe Acrobat 2.0

**The new version of this portable document creator and reader adds full-text indexing and more straightforward pricing.**
**Adobe Systems, Inc.**
**800/833-6687, 415/961-4400 List price: $195, Pro $595, Workgroup Edition $1595, reader free**
**Reader service no. 742**

INTRODUCING THE ASCENTIA™ 900N PERFORMANCE NOTEBOOK. Not since the days you bumped up to the front row in an old Chevy and looked up at a screen the size of a building has something looked so striking. This is one monster screen, with ten and a half inches of TFT active-matrix or dual-scan STN color. It's the biggest screen available today.

Your work will dazzle with vibrant colors, and your audience will appreciate the kind of high definition that makes the most complex graphics, even the fine print, quite readable.

Still, there's plenty more to the

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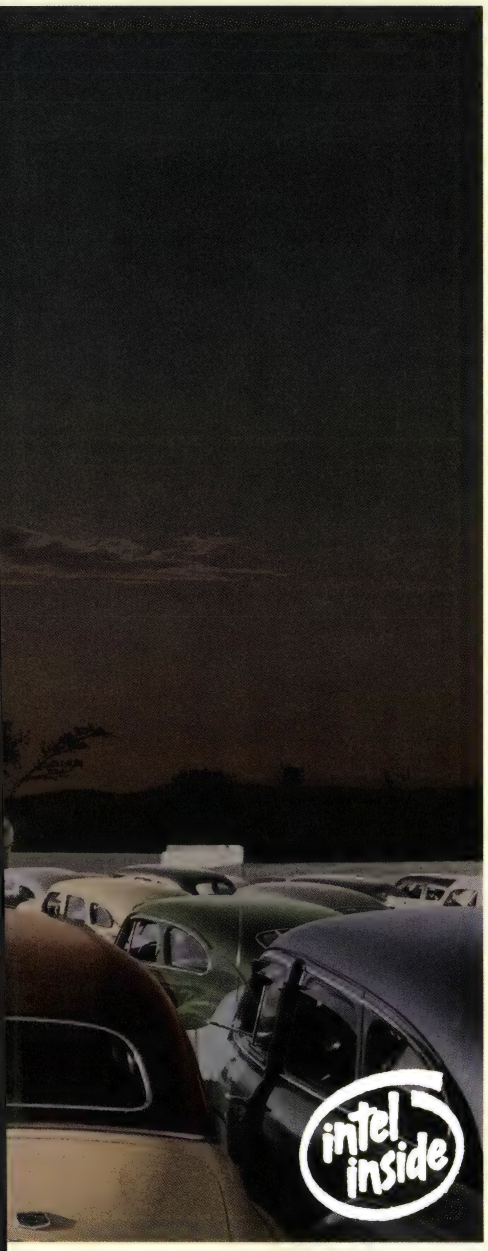


| | AST 900N | IBM 755C,Cs | COMPAQ LTE ELITE | TOSHIBA T4800CT |
|---|---|---|---|---|
| Screen | 10.4" TFT 10.3" DS-STN | 10.4" TFT 9.5" DS-STN | 9.5" TFT | 9.5" TFT |
| Battery Life | 4-8hrs | 3.1-8hrs | 2.5-4hrs | 2.5-4hrs |
| Pointing Device | Integrated Trackstick | Integrated Trackpoint | Integrated Trackball | External Trackball |

*Intel DX4/75MHz comparable products as of 6/13/94. Screen measured diagonally. Battery life from manufacturers' specifications.*

900N than just an eye-popping screen. This is very much a high performance notebook, with a powerful Intel 486 processor, up to 75MHz. Local bus architecture combined with hardware accelerated graphics deliver as much as 16 million WinMarks.

Inside, AST's intelligent power management system actually adjusts the computer to your work habits, taking a breather when you do. So the battery life lasts from four to eight hours or about the length of a Godzilla film festival. That's longer than a similar Compaq or Toshiba laptop.

In fact, everything you need to be truly mobile is right here. For instance, the pointing stick is right at your fingertips. There are two PCMCIA slots. Or, if you prefer, you can add a docking station for more expansion.

Of course, there is a three-year worldwide limited warranty,* with a year of 48-hour rapid repair service.** And our telephone support group is here to help you every day, 24 hours a day. It's the kind of responsiveness you'd expect from the fifth largest manufacturer of personal computers.[1]

You've got to see the new Ascentia 900N notebook from AST. For a screening or more information, please call 800-876-4AST.

Intel DX4/75MHz or DX2/50MHz.

10.4" or 9.5" diag. TFT, or 10.3" diag. DS-STN color display.

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**Circle 44 on reader service card**

# Pen Input and Desktop Conferencing in One Package

Though pen computing has gained a foothold in the hand-held computer market, this alternative to standard mice and keyboards has failed to attract mainstream PC users. Now, FTG Data Systems is offering PenDirect for Windows, a $298 bundle that combines pen hardware with desktop applications that make the most of the technology.

Although PenDirect comes with handwriting recognition software, I was more impressed with the FutureLabs' desktop conferencing software, TalkShow Duo. The lightpen provides a nice input alternative for interactive graphical products like TalkShow.

TalkShow Duo is a scaled-down version of TalkShow, one of the more powerful and easier-to-use desktop conferencing packages. Like other such packages, Duo lets two people transform their PC screens into the equivalent of a whiteboard: One user can see and respond to what the other writes and draws on the screen. Tools are included for pointing to, highlighting, and adding text. Although the products work with a mouse, the included pen renders the user interface almost transparent—annotating and drawing is faster and more accurate.

The most important difference between conferencing packages and a real whiteboard is that the former lets you communicate with users down the block or across the world. Use the product with a modem to display PC-based documents and make presentations remotely. Then use the whiteboard features and pen to make notes on the screen.

TalkShow Duo allows remote connections between two PCs using a modem or a NetBIOS-compatible network, such as LAN Manager or Windows for Workgroups. Performance was acceptable with a 14.4-kbps modem at each end, but I wouldn't use anything slower.

A $99 upgrade transforms TalkShow Duo into the full-featured TalkShow product, which adds support for unlimited conferees plus NetWare and TCP/IP network connections.

PenDirect works with other applications as well. Since tapping the pen on the screen is equivalent to clicking the mouse, the product can make any Windows application a little more intuitive to use, particularly for novices.

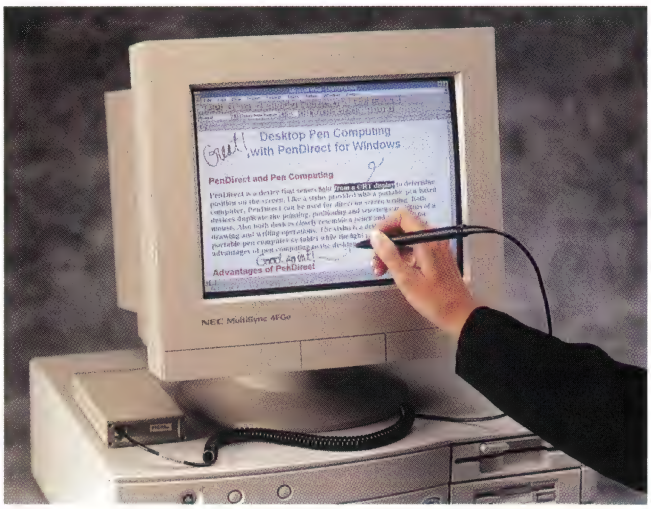
The product works with many mouse-enabled DOS applications, and you can use your mouse concurrently—both devices work interchangeably without restarting Windows.

Some limitations to be aware of: The product works best with standard desktop monitors (CRT displays) but doesn't work with LCD screens, such as those found on notebooks.

**—Jeff Noxon**

### FTG PenDirect for Windows with TalkShow Duo

**Light-pen system includes conferencing software.**
**FTG Data Systems**
**800/962-3900, 714/995-3900, 714/995-3989 (fax)**
**List Price: $298 bundled with TalkShow Duo; TalkShow upgrade $99**
**Reader Service No. 743**




**DESKTOP CONFERENCING SIMPLIFIED: PenDirect for Windows bundles a pen input device with FutureLabs' conferencing software.**

# A Home For Your Addresses

METZ Phones 5.5 is a slick new address and telephone number management program for Windows. Its networking features let you share business contacts or even publish a corporate phone book over your network while preserving a personal contact file on your own computer. Users of Microsoft's Office software suite will doubly appreciate METZ Phones: It uses tool bars and menus similar to those found in Office applications.

METZ Phones adds plenty to basic search-and-sort functions for your address book entries, like maintaining multiple address books, keeping free-form notes with addresses, importing and exporting information, and pasting entries into any Windows application. You can store as many different phone numbers as you need for each record (fax, cellular, home, business, and more), schedule calls, and auto-dial numbers from any Windows application. In addition, METZ Phones offers flexible printing of individual labels and records, or entire address books.

METZ Phones achieves a simplicity many other products only hope for. Installation is easy, as is entering names, addresses, and numbers as well as adding supplementary notes to address records. Resetting an annoying default that prompted me every time I changed a record was effortless, as was just about everything else in this useful utility.

**—Peter Loshin**

### METZ Phones Version 5.5

**Simple yet powerful address and telephone manager.**
**METZ Software 800/447-1712 206/641-4525**
**List price: $89 single user, site licenses available**
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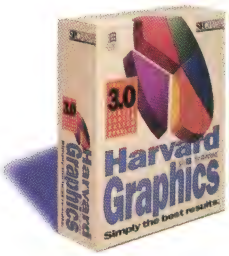


# Introducing Harvard Graphics 3.0.

Want some advice from an expert to make your presentations more effective? There's one inside every box of new Harvard Graphics 3.0. With this new version, Harvard Graphics takes its most popular feature—the Advisor—and carries it forward a quantum leap. The new Advisor System puts thousands of hours of presentation savvy to work for you, automatically. Suddenly, the guesswork and gruntwork of putting together a presentation are ancient history. You get Design Tips to help you choose the right colors and layouts. Quick Advice to tell you what kind of chart will best dramatize your data. And the Design Checker to review and improve on your whole presentation, just like a spellchecker. Want to make it really easy on yourself? Just use one of the enclosed Quick Presentations—a collection of polished presentations you can instantly customize for your own use. But all this is just scratching the surface. New Harvard Graphics 3.0 contains all kinds of new features. And it works with all your other Windows applications. Upgrading is a no-brainer. So, go ahead, just pick up the phone.

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**Circle 52 on reader service card**

## Network Central

Hidden behind a name that evokes visions of curmudgeonly LAN administrators, tangled wires, and downtime headaches is one of the most useful personal and group productivity applications around. Network Central lets you organize files by people and project, rather than by physical location, on your local and network hard drives. You can simply create a folder for a project and add tags for all the word processing, spreadsheet, graphics, and other files that relate to the project. The abilities to monitor file and directory changes and to assign completion dates to projects make Network Central an outstanding work-group tool. And the program lists your top projects on a Windows button bar, so important files are only a keystroke away. Network Central lists for $99.99 for a two-user license. First Floor, Inc., 800/639-6387, ext. 614.

**Reader service no. 687**

## DeskJet 540/320

Hewlett-Packard keeps rolling out new printer models, with more features for lower prices. The latest examples are two new low-cost ink jet models. The DeskJet 540 replaces the DeskJet 520 and 500C. It offers 512K RAM, a faster processor, updated drivers, and 600 by 300 resolution in black and white with HP's Resolution Enhancement technology. The company claims that the 540 is twice as fast as the printers it replaces. Priced at $365, the 540 adds an easy path to color (with 300 by 300 resolution), using a $49 color upgrade kit. Then there is the DeskJet 320, which is HP's 4-pound, battery-operated portable ink jet printer. The specs are essentially the same as the DeskJet 540's, including the color upgrade option. The 320 lists for $379; an optional sheet feeder is $99. Hewlett-Packard, 800/752-0900.

**Reader service no. 688**

## STB PowerGraph Pro, Genoa Phantom 64

If you want an affordable Windows graphics accelerator that features the latest 64-bit technology, STB Systems and Genoa Systems may have the answer. STB's PowerGraph Pro and Genoa's Phantom 64 both use S3's Vision864 accelerator chip and 2MB of inexpensive DRAM to provide high resolution and fast graphics performance. Genoa can display refresh rates up to 1600 by 1200 resolution; STB, at 1280 by 1024. Both display 24-bit color at 800 by 600. In addition, the PowerGraph Pro uses STB's new Vision software, which lets you switch Windows resolutions without first having to exit to DOS. Vision also provides tools for working with virtual desktops (larger than the actual screen size), among other functions. The STB PowerGraph lists for $229, and the Genoa Phantom 64 lists for $279. STB Systems, 800/234-4334

**Reader service no. 691**

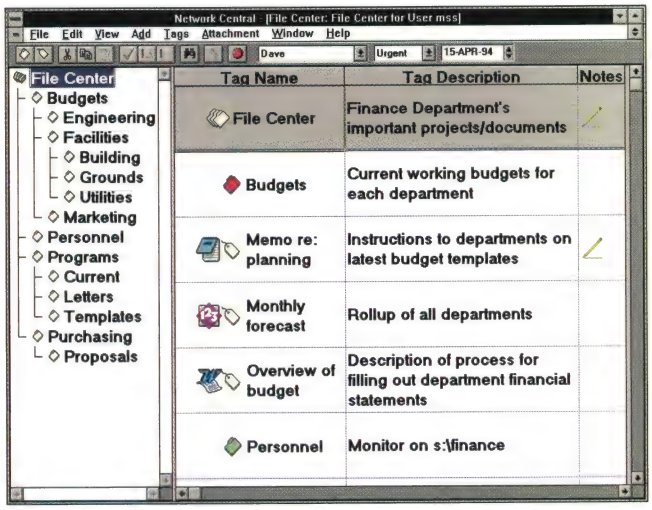
Genoa Systems, 800/934-3662

**Reader service no. 692**

## Font Source

Where is the paperless office when you need it? To sign an electronic document, you typically must use a fake-looking script font or cut and paste it from a fax or scan. But thanks to Font Source, you can quickly and easily add your *real* signature or company logo to any document. Simply mail your signature or logo to Font Source, and the company will create your own TrueType font from it. You can then add your personal mark to your documents with a keystroke. (Complex color logos may require two or three keystrokes.) Signatures cost $35, and most logos are $99.95—but color logos can run as high as $300. Font Source Inc., 615/ 522-8059.

**Reader service no. 689**




**CAN'T FIND NETWORK FILES? Network Central lets you organize files in folders—regardless of their physical location on your LAN.**

## ViVa PCMCIA Fax-Modem

If you want to take your voice mail with you, Computer Peripherals' ViVa 14.4 PCMCIA modem features voice, data, and fax capabilities—all in a Type II PCMCIA card. Using data compression, the modem transfers data at speeds up to 57.6 kilobits per second (kbps). The fax component is compatible with Class 1 and 2, sends and receives at speeds up to 14.4 kbps, and has a fax-forwarding feature. The modem includes software for setting up your own voice mail system, and it also includes fax and communications software. The ViVa 14.4 PCMCIA modem is available for a street price of about $250. Computer Peripherals, 800/854-7600, 714/470-1758 (fax).

**Reader service no. 690**

## PCI Movie

MULTIMEDIA When is a graphics accelerator not a graphics accelerator? When it's also a full-featured video capture and playback board. Like several competing graphics boards, VideoLogic's PCI Movie uses Weitek's P9100 chip and 2MB of VRAM to speed up Windows graphics, providing fast refresh rates and resolutions up to 1280 by 1024. But the PCI Movie also includes VideoLogic's own PowerPlay 32 full-motion video enhancement chip, which expands, smooths, and enhances digital-video quality. The result: A one-board solution that provides both graphics and video with less hassle and lower cost than buying separate boards. The PCI Movie lists for $499. VideoLogic, 800/578-5644.

**Reader service no. 697**

**For more information about any product, contact the manufacturer or circle the number on the reader service card.**

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it's the wake-UP CALL for a NEW way of WORKING.
TIME TO rise and shine.

# INTRODUCING 1-2-3 RELEASE 5. NOW THE LEGENDARY SPREADSHEET BRINGS MORE PEOPLE TO THE NUMBERS AND THE NUMBERS TO LIFE.

1-2-3® has always helped individuals become more productive. Now it goes to a new realm—workgroup productivity. With strengthened ties to Lotus Notes® and new, sophisticated routing features, workgroups are using 1-2-3 Release 5 to make decisions, reach consensus and explore possibilities.

No other spreadsheet has the features of 1-2-3 Release 5. Features that make everyday spreadsheet tasks easier. Features that help you move from task to task fluidly. Maximum productivity, minimum effort.

## TAP THE POWER OF NOTES WHEN YOU'RE IN 1-2-3. TAP THE POWER OF 1-2-3 WHEN YOU'RE IN NOTES.

Say you're working on the annual budget in 1-2-3. You can save your spreadsheet in Notes. Then share ideas and information with colleagues working on the same budget at the same time.

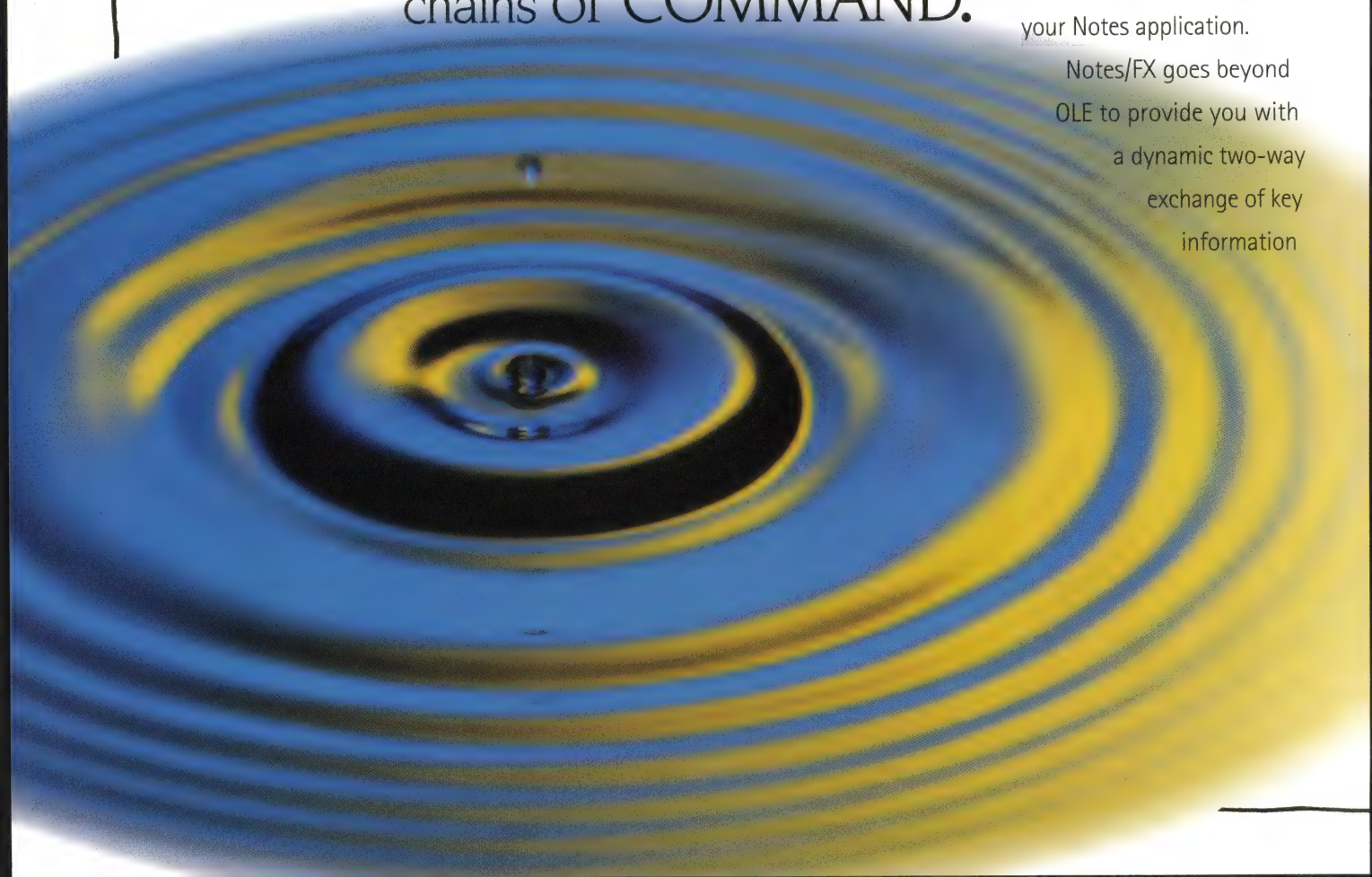
Lotus NOTES READY

Any changes to your spreadsheet are automatically synchronized and distributed thanks to Notes replication technology. Plus Notes' security protects the integrity of your data.

When you're working in Notes and want to crunch numbers, prepare budgets or perform "what-if" analyses, you can launch into 1-2-3 with Notes/FX™ 1.1—to get the power of 1-2-3 right in your Notes application.

Notes/FX goes beyond OLE to provide you with a dynamic two-way exchange of key information

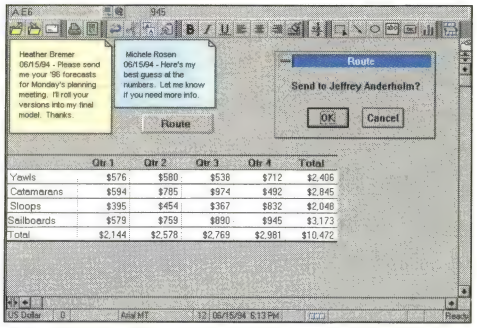
# freedom of MOVEMENT, NOT chains of COMMAND.



veen Notes and 1-2-3. So you can roll that 1-2-3 ormation back into any Notes application.

## POWERFUL WORKGROUP FEATURES EVEN WITHOUT NOTES.

1-2-3's powerful Version Manager™ lets each person in your workgroup save multiple sets of charts to any name range. So you know the who, what, when and why of every change all the time.




1-2-3's Range Routing lets you share data with colleagues—sequentially or all at once—collecting their comments and input into a single document.

Plus, unlike other spreadsheets, 1-2-3 can designate particular ranges for comment or review by particular users, rather than routing the entire worksheet. Range Routing lets you mail the spreadsheet range to work-group members for input, track progress, then roll everyone's ideas back into your file, complete with comments and changes tracked as versions.

1-2-3 Release 5 worksheets and ranges can be routed using either VIM or MAPI based e-mail and can be routed either serially or in parallel.

## MAXIMUM PRODUCTIVITY, MINIMUM EFFORT.

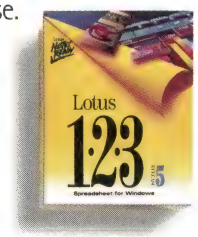
1-2-3 Release 5 is packed with innovative new features designed to help you get more done with less effort.

SmartMasters™ are predesigned and customizable templates of everyday business forms—like expense reports, invoices and purchase orders—with built-in intelligence to guide you through common tasks in record time. Or create custom SmartMasters for yourself or your workgroup.

With Lotus Maps you can create instant maps of geographic data. Select a range of data and watch 1-2-3 Release 5 create the appropriate map with color-coding based on data ranges. 1-2-3 Release 5 ships with maps for the world by country, U.S. by state, Canada by province, Europe, Mexico, Japan, Taiwan and Australia.

1-2-3 Release 5 features seamless integration with Lotus Approach® database to easily create data entry forms and generate reports and mailing labels.

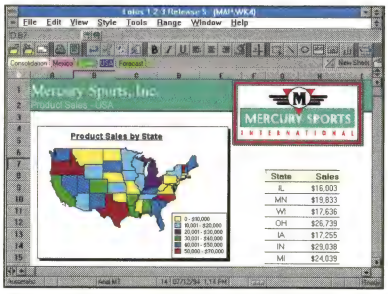
With Fast Format you can apply the formatting you've designed for one range to any other range in the worksheet—with one click of the mouse.




One-Step Charting lets you build a chart complete with labels, titles and legends, all in a single step.

Drag-and-Fill fills in ranges from other documents in just one step. And our improved OLE 2.0 Drag-and-Drop lets you move copy or data across worksheets or files fast.

Multi-page Print Preview lets you view up to nine spreadsheets on your screen before you print.




1-2-3 Release 5 features Lotus Maps. It's the easiest, most effective way to analyze your spreadsheet data geographically.

Taken all together, the new 1-2-3 is loaded with enhancements that make getting the job done a whole lot easier—alone or in a workgroup. And 1-2-3 Release 5 gives you the best compatibility with 1-2-3 for DOS of any spreadsheet. To learn more about 1-2-3 Release 5, visit your Lotus Authorized Reseller or call **1-800-TRADE-UP, ext. A231*** for a free demo disk. A 1-2-3 upgrade costs $119.**

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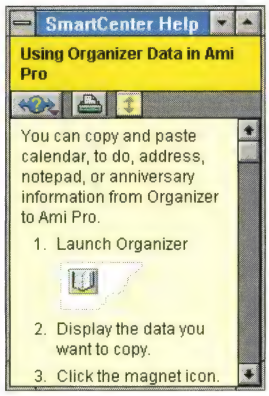
Working Together®

# NEW SMARTSUITE 3.0. A MAJOR RELEASE TO HELP YOU AND YOUR TEAM WORK TOGETHER.

To work better people need powerful desktop applications, built for both individual and team productivity. SmartSuite® 3.0 is exactly that. It's the best suite for this new way of working because it's the only suite built to optimize Lotus Notes.

The applications that make up SmartSuite have been upgraded in some very important ways—so they work harder and work together better than ever.

1-2-3 Release 5 is packed with new features like SmartMasters spreadsheets templates, Lotus Maps for geographic visuals of data, Smart Assistants to guide you, seamless integration with Approach database, Range Routing for mailing spreadsheet ranges, OLE 2.0 Drag-and-Drop, and, of course, Lotus Notes Integration.




Help Card, one of SmartSuite's powerful help tools, guides you through cross-application tasks.

The new Lotus Approach 3.0 offers unprecedented ease-of-use, PowerClick™ reporting, X10™ technology (our new, exclusive, speed-optimized architecture) and the easiest-to-design forms, mailing labels and cross-tabs on the market.

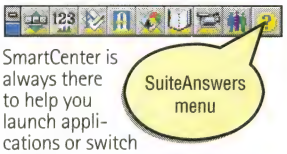
Lotus Ami Pro® offers powerfully fast word processing (49% faster than Word, 103% faster than WordPerfect®†), low memory/hard disk requirements (4MB RAM, 19MB for complete installation), with proofing tools, collapsible click-and-drag outlining, revision marking, powerful macro language and automatic list renumbering. There are over 55 predesigned style sheets for memos, faxes, reports and more. Built-in charting & in-context drawing tools. Ami Pro also seamlessly imports ments from other word processors.

Freelance Graphics® 2.1 features task and indus specific SmartMasters, a unique 3-step process to create presentations, charting and drawing, presentation management and improved import/export capabilities.

And Organizer™ 1.1 offers easy linking for cross-referencing, flexible printing, group scheduling and nifty integration with Ami Pro so you can create monthly calendars in Ami Pro from Organizer appointments.

## SMARTSUITE 3.0 IS A BETTER INTEGRATED SUITE ACROSS THE BOARD.

The integration in SmartSuite begins with a consistent look and feel across applications—they share a common user interface, menus, SmartIcons® and a Live Status Bar.




SmartCenter is always there to help you launch applications or switch between them. And Bubble Help is right there for you-all you do is point.

SmartCenter, the headquarters for cross-application services, is always there to help you switch or launch applications. You can customize its icon palette into the configuration that's most convenient for you.

SuiteAnswers are cross-application help tools which include a SmartSuite Guided Tour and task-oriented Help Cards—plus the new ScreenCam™ for creating audio/visual "screen movies." It's the only help service in Windows™ that stays up as you move between applications.

Smart Assistants are your step-by-step guide through common tasks.

And our powerful 1-2-3/Approach database integration lets you analyze and format 1-2-3 data, taking full advantage of Approach's easy-to-use

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See how the new SmartSuite 3.0 helps workgroups work. Get a FREE Lotus Gallery CD, including trial versions of all the new SmartSuite apps.† Send this card to us or call **1-800-TRADE-UP, ext. 9813**

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"workgroup processor." Use the built-in Notes database for efficient, secure document sharing and tracking. And you can format your Notes or cc:Mail® messages directly in Ami Pro.

Approach 3.0, the top-rated Windows database, becomes a shared reporting, forms and analysis tool. Its advanced integration with Lotus Notes lets you build sophisticated, information-intensive workgroup applications and join Notes data to other types of databases, from dBASE to SQL.

And Freelance Graphics 2.1, used with Notes, becomes a presentation storage system, a library of past presentations, which a team can browse and pull from to create new ones.

For more information on SmartSuite Release 3.0 and each of the 5 top applications that make up SmartSuite, visit your

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## SMARTSUITE 3.0

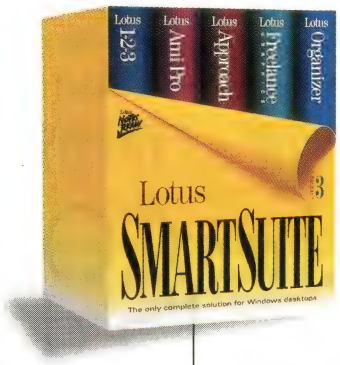
SmartCenter
(to move between applications)

SmartMasters
(for predesigned templates)

Fast Format
(apply styles throughout documents)

ScreenCam
(to put your ideas in motion)

Smart Assistants
(to guide you)



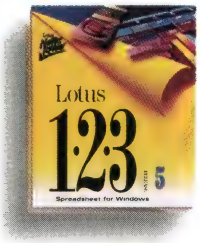

Configurable Single Install
(for easy one-step installation)

Small Footprint On Your PC
(the most efficient suite available)

1-2-3/Approach Integration
(database power in your spreadsheet)

Lotus NOTES READY™

### 1-2-3 RELEASE 5 SPREADSHEET




SmartMasters
(useful predesigned templates)

Lotus Maps
(geographic visuals of data)

Lotus Approach Integration
(for extra database power)

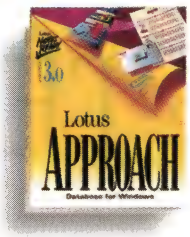
Smart Assistants
(to guide you)

Range Routing
(for mailing spreadsheet ranges)

Direct Access To Database Files
(open dBASE and Paradox® files directly into 1-2-3)

OLE 2.0 Drag-And-Drop
(move or copy data, with visual mouse cues)

### APPROACH 3.0 DATABASE




PowerClick Reportwriter
(for wysiwyg design)

Smart Assistants
(to guide you)

InfoBox
(instant on-screen manipulation)

X10 Speed Architecture
(for blazing speed)

Lotus 1-2-3 Integration
(for working with 1-2-3)

PowerKey™ Technology
(for direct access to existing data)

Dynamic Crosstabs
(for drag-and-drop analysis)

### AMI PRO 3.1 WORD PROCESSOR

New Proofing Tools
(for easy document proofing)

Collapsible Click-And-Drag Outlining
(simplifies organization)

Revision Marking
(edit documents without confusion)

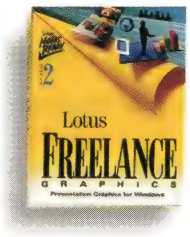
New Style Sheets
(more professionally designed templates than ever)

Text Styling
(make your e-mail look better)

WordPerfect Switchkit®
(the move from DOS is painless)

Stick-It Notes
(add comments and messages)

### FREELANCE GRAPHICS 2.1 PRESENTATION GRAPHICS



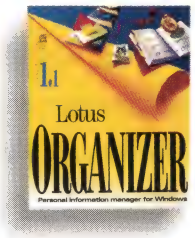

Unique Three-Step Process
(for quick and easy presentations)

One-Click Charting
(access a library of charts and drawings with one click)

Page Sorter
(presentation management at a glance— review and rearrange with ease)

Import/Export
(more file formats than ever— including Harvard/DOS and PowerPoint® 3.0)

### ORGANIZER 1.1 PERSONAL INFORMATION MANAGER




Easy Linking
(makes cross-referencing simple)

Flexible Printing
(for your manual planner, mailing labels from your address book)

Group Scheduling
(use with cc:Mail to set up meetings with anyone on your WAN or LAN)

Real Time Access
(instantly view co-workers' busy and free time)

# how the NEW SMARTSUITE 3.0 HELPS workgroups work.

The new SmartSuite 3.0. Featuring major new releases of 1-2-3, Ami Pro, Approach database and Freelance Graphics—plus the popular and powerful personal information manager Organizer—this is the ultimate integration of your most important desktop tools. For more information on SmartSuite Release 3.0 and each of the 5 top applications that make up SmartSuite, visit your Lotus Authorized Reseller or for a comprehensive multimedia overview call **1-800-TRADE-UP, ext. A232*** for the free Lotus Product Gallery CD. A SmartSuite upgrade costs $299.††

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Get answers *every day* a spreadsheet can't give you *any day*

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Use SPSS 6.1 for Windows when you need in-depth answers quickly and easily. Go beyond summary statistics and spreadsheet row-and-column math by using the right tool for the job. SPSS is a complete tool kit of statistics, graphs and reports that enables you to answer tough questions like:

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- How satisfied are my customers?
- What are the patterns in my data?

## SPSS products are used today for:

*Survey research of all types*
- Explore consumer awareness
- Compare perceptions of products
- Discover preferences by group

*Marketing and sales analysis*
- Analyze your customer database
- Forecast sales by product and region
- Improve mailing responses
- Learn which promotions work best

*Quality improvement*
- Assess process capability
- Reduce nonconformance
- Spot unnatural patterns of variation
- Track incidence of infection

*Research of all types*
- Test hypotheses
- Determine group differences
- Track performance over time
- Prepare professional reports

## Answer your tough questions

You don't need a Ph.D. to learn or use SPSS 6.1 for Windows. A tutorial, task-oriented help and a glossary of statistical terms will help make you an expert. You'll be surprised at how easy it is to do in-depth data analysis.

And, if you are already an expert, you'll appreciate SPSS' rich set of statistical functionality. Whatever your experience level, you'll be able to explore your data thoroughly.

Discover hidden patterns and trends in your data with over 50 high-resolution business, analytical and SQC charts. SPSS saves you time by automatically aggregating your data and labeling your charts. Then, quickly add smoothing lines, confidence intervals and more to tell the full story in your data.

Call today to find out how to answer your tough questions every day with SPSS 6.1 for Windows!

**Get a great value – order now!**

Call (800) 543-5837

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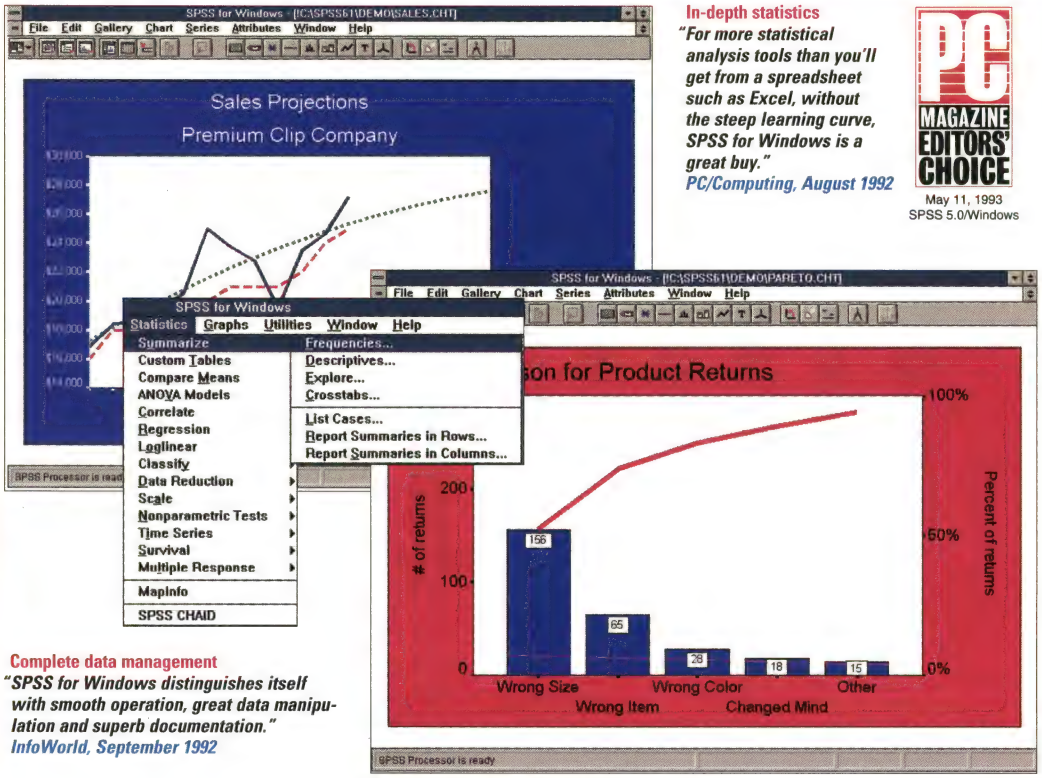


**In-depth statistics**
*"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy."*
*PC/Computing, August 1992*

PC MAGAZINE EDITORS' CHOICE
May 11, 1993
SPSS 5.0/Windows

**Complete data management**
*"SPSS for Windows distinguishes itself with smooth operation, great data manipulation and superb documentation."*
*InfoWorld, September 1992*

**Automatic statistical graphs**
*"A complete set of graphics and charting capabilities."* *PC Week, May 1992*

**Learn fast, work fast**
*"SPSS for Windows is an excellent full-featured set of statistical procedures...The Windows interface makes it easy and fast to use and I highly recommend it."* *Marketing Research, Summer 1993*

## Reasons SPSS 6.1 for Windows goes beyond your spreadsheet:

- 60+ statistical procedures
- 50+ business, analytical and SQC charts with automatic labels
- New toolbar which gives you one-button access to statistics and commonly used functions
- Technical support for statistical help
- New online tutorial
- Statistical help system
- Glossary of statistical terms
- Fast 32-bit processing
- Hot buttons between graphs and tables
- Work with even your largest data sets
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- View your data as words, while doing analysis with numbers
- Keep your formulas safe and separate from your data
- ODBC / OLE
- Statistics located in easy-to-understand menus and dialog boxes
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- Documentation which clearly explains statistics
- Create charts with your analysis automatically
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yes It runs with NetWare

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**Circle 253 on reader service card**

Is it smart to invest money in upgrading an older PC? The answer is yes—provided you pick the right parts to replace and the right time to do it.

# Upgrades

## When They're Worth It, and When They're Not

By Eric Knorr

Software has gone power-mad. Word processors have mushroomed into desktop publishing programs. Spreadsheets have grown so big and smart they guess what you're going to do before you do it. And thanks to all that powerful new software, your PC has gotten...slow. Suddenly it takes several seconds for a dialog box to pop up and even longer—sometimes much longer—for a file to load.

So what should you do about it—upgrade or trade up? Add fast new components to the PC you have, or bite the bullet and pay major bucks for a new machine?

We wanted a good answer to that question once and for all. So we fed our standard system benchmark suite to three test machines—a 386DX-33, a 486SX-25, and a 486DX2-66. Then we increased each computer's RAM and tested them all again. Next we upgraded the CPUs in the 486SX and 386DX and had those two systems chew on the suite for a third round of testing. Following that,

DAVID PLUNKERT

we ran the 386 system through its paces again with a new Hercules graphics accelerator card. Finally, we loaded the 386 with the works—the extra RAM, the two upgrade CPUs, and the Hercules accelerator—and tested it one last time. Test results in hand, we compared the performance of our various upgraded configurations with that of the base systems and with that of new PCs recommended in recent *PC World* system review Top 20s.

But performance isn't everything. You also have to consider cost. To find out how much you'd pay for these various upgrades, we added the street prices of the components to the depreciated costs of the base systems (the price quotes for used systems were from the American Computer Exchange, Atlanta). Then we plugged all this pricing and testing information into the same spreadsheet we use to evaluate PCs in our monthly system review Top 20s. For the sake of comparison, we ranked the resulting overall value ratings with those of systems recommended in recent reviews.

Unfortunately, this kind of price/performance comparison doesn't take into account some of the less quantifiable but equally important advantages of a new PC. New systems come with brand new components (including, probably, a much larger hard drive), the latest in system design, and a fresh warranty. That's why, when evaluating these different upgrades, we also applied what we call the the upgrader's rule: When upgrading an old system, don't spend more than 40 percent of what it would cost to purchase a new machine that's twice as fast.

For example, a 386DX-33 is about half as fast as a new 486SX-33. If the SX-33 costs $1000, you shouldn't spend more than $400 to upgrade the 386. The one time you can ignore this 40 percent rule is when you're adding parts you can transplant later to a new machine. A new IDE or a SCSI hard disk, for instance, will feel right at home when you finally buy that 486 or Pentium, but 30-pin SIMMs may not.

So what did we find out from all this number-crunching? First, no matter what system you use, make sure it has at least 8MB of RAM. Second, if you have a 486SX (or for that matter, a 486DX) and want some extra kick, an Intel OverDrive upgrade CPU is a good deal. Third, upgrading a 386 can provide tangible improvements, but at a certain point you'll be better off investing your money in a fast new PC.

### Quick Fixes for 386s

Of course, it's easy for us at *PC World* to say, "Buy a 486 or a Pentium," but not everybody can afford one. If you filled out those multiple request forms for a new PC months ago to no avail, or you want to squeeze more life out of your 386 at home, don't despair—there are ways to put more oomph into an older system. The trick is to keep your spending to a minimum, and to apply those dollars where they'll do the most good.

The least expensive upgrade—ramping up to 8MB of memory—is worth it, even if you need to bum spare change to come up with the $35-per-megabyte market price. Upgrading our 386DX's RAM from 4MB to 8MB produced an average speedup of 12 percent on the Windows apps we tested, 9 percent overall—not bad for $140. And this increase doesn't take into account the benefits you'll see when running multiple Windows applications at the same time.

The only case in which upgrading RAM may not be a good idea is if your system uses expensive nonstandard memory. (To see if your machine falls into this unfortunate category, check your system manual or call the manufacturer's tech support line.) For example, it costs a prohibitive $500 to upgrade the proprietary memory of an AST Premium 386-33 from 4MB to 8MB—and that's if you can find a supplier that stocks old AST memory boards.

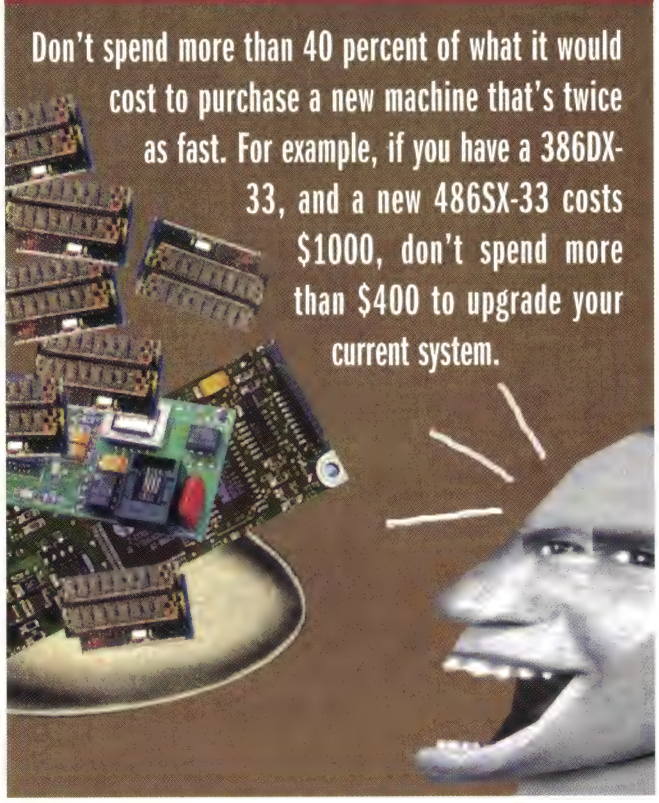
Adding a new Windows video accelerator also makes sense, as long as you use Windows apps primarily and your current graphics adapter is two or more years old. We swapped out our 386's old Trident controller for a new $220 Hercules Dynamite Pro and saw Windows performance go up 12 percent on average and a tasty 39 percent in Word for Windows. But because the accelerator did nothing for DOS apps, overall performance went up just 7 percent. The newer your current adapter is, the less of a performance boost you're likely to see. Assuming your system accepts standard memory, adding 4MB along with a new accelerator may be one of your best options: In our 386 test system, Windows performance leapt an impressive 28 percent with this two-part $360 upgrade.

### 386 to 486?

No matter how much we improved its memory or graphics, however, our 386 still wasn't comparable in performance to a new 486. For that we had to upgrade the CPU. We replaced our benchmark system's 33-MHz 386 with the Cyrix 486DRx2 Upgrade Microprocessor, a clock doubler that purports to deliver 486-level performance

## The Upgrader's Rule

**Don't spend more than 40 percent of what it would cost to purchase a new machine that's twice as fast. For example, if you have a 386DX-33, and a new 486SX-33 costs $1000, don't spend more than $400 to upgrade your current system.**



for around $350. The Cyrix chip certainly improved the 386's performance, if not to true 486 levels: Our 386 sample system started out 35 percent slower than our 486SX-25 test bed and was still 17 percent slower with the Cyrix chip installed. When we combined the Cyrix processor with a 4MB memory upgrade, that margin decreased to around 7 percent. After adding the Hercules accelerator, we finally had a system faster than our 486SX.

All this upgrading would cost about $700 on the street. On a strict price/performance scale, adding the Cyrix chip to a 386 looks better than buying any one of several low-end 486s we've recommended in recent system reviews. But when you invoke the 40-percent rule, this total upgrade doesn't make sense. $700 is 40 percent of $1750. For that kind of money, you could get a system that's not only significantly faster than the upgraded 386, but would also have all new hardware and a nice, fresh warranty.

The same thing held true when we replaced the Cyrix chip with the Rev to 486 CPU upgrade module from Evergreen. The Rev to 486 uses an Intel DX4-100, and its test scores were accordingly impressive: It improved overall system performance 37 percent all by itself; performance improved more than 60 percent on our WordPerfect and 1-2-3 tests. With another 4MB of system RAM and a new accelerator, our 386 was faster than our baseline 486DX2-66.

## Expert Upgrades: Playing the Slots

**I've never really paid much attention to my PC's hard disk controller or I/O (input/output) cards. As long as my disk spun, my modem shrieked, and my floppy drives stayed floppy, I was happy. Then one day I bought a scanner that came with a card of its own, and I discovered I had run out of slots.**

**That's when I decided to install T.S. MicroTech's FanCard-Combo-VL, which consolidates a drive controller, I/O ports, and more on a single local bus card, freeing up a slot or two on my crowded motherboard.**

**Even better, the FanCard's local bus drive controller is much faster than my old one. The card also comes with a pair of high-speed 16550-compatible serial ports, a parallel port, and a game port. And I get some fancy extras—like two low-voltage fans that pump 25 cubic feet of smoggy Pasadena air through my system every minute to keep it running cool, and a DC jack for my speakers.**

**Best of all, installing the FanCard took 10 minutes. I just popped the hood, unhooked my hard disk and floppy cables, yanked out the old controller and I/O cards, stuck the FanCard into the local bus slot, and reattached the wires. The hardest part? Finding the screw I dropped in the case. • *FanCard-Combo-VL $69.95 (street price); T.S. MicroTech; 310/787-1640, 310/787-1647 (fax).* Reader service no. 705**

**—Steve Bass**

Unfortunately, the Evergreen chip costs about $700 on the street; with the additional RAM and a new graphics card, you're talking about a $1000 upgrade. On a pure price/performance basis, the Evergreen chip makes this old 386 look as good as several 486s that we've recommended in recent reviews. But considering that you can buy a brand new DX2-66 for around $1500, $1000 is too much to spend upgrading a 386.

### The 486 Shuffle

What if you already own a 486? You have several upgrade options. No matter what kind of 486 you have, you should have at least 8MB of RAM, especially if you multitask applications. How much of a performance gain can more memory give you? Consider the two biggest memory hogs in our test suite, Freelance and Paradox for Windows. Doubling the RAM to 8MB pumped up the performance of these two apps by 33 percent on our 486s. The results weren't as impressive with the other Windows apps—but remember, our benchmarks test only one application at a time. If you multitask two or more Windows apps, these Freelance and Paradox scores probably *underestimate* the improvement you can expect.

Note that adding memory boosted our DX2-66's performance more than our SX-25's (22 percent in the former case, 15 percent in the latter). Also, adding RAM beyond 8MB is less likely to provide such a dramatic speed boost, unless you typically juggle huge, memory-intensive applications such as desktop publishing programs or high-end graphics software.

## Expert Upgrades: Faster Than You Can Say "PCMCIA"

**For years, PCMCIA cards have been the one-stop hernia cure for power-crazed notebook luggers. PCMCIA devices pack memory, fax-modems, hard drives, and even LAN adapters into a package that looks like a bulked-up credit card. But why should notebook users get all the cool toys? By installing a PCMCIA card reader-writer—like SCM Microsystems' SwapBox Classic—in your desktop PC, you can swap data and devices with ease between your road machine and your desktop.**

**The SwapBox may look like a floppy drive, but it holds PCMCIA Type I, II, or III devices—everything from wafer-thin memory cards to 10.5mm-thick hard disks. It supports hot-swapping, so you can eject one card and plug in another without rebooting. Installation is straightforward—just plug the interface card into a 16-bit ISA slot and bolt the SwapBox into an empty drive bay. SCM's installation software tells your system which drivers to load at start-up, and there are no nasty jumpers or DIP switches to futz with (though you may need to reconfigure your sound or video board if you run into conflicts).**

**Here's the best part: Once you've installed the SwapBox, you can add a hard drive, modem, or what have you to your system by simply plugging in a card. You may never have to pop the top on your PC again. Now *that's* what I call an easy upgrade. • *SwapBox Classic $179; SCM Microsystems; 408/395-9292, 408/395-8782 (fax).* Reader service no. 706**

**—Daniel Tynan**

Owners of low-end 486SX or 486DX system also have the option of upgrading their CPUs. In fact, our tests demonstrate that people with 25-MHz 486SX systems have little excuse *not* to buy a clock doubler. Paired with an extra 4MB of RAM, Intel's DX2 and SX2 OverDrive processors—which Intel assures us should be selling for about $200 a pop by the time you read this—cranked up our SX-25's overall performance 43 percent. (If this seems slow for a "doubler," remember that these chips accelerate only *processing* performance; they can't speed up memory or hard drive access.) A total of $340 ($200 for the CPU, $140 for the RAM) is an extremely reasonable investment for this kind of performance boost, well within the limits of our 40-percent rule.

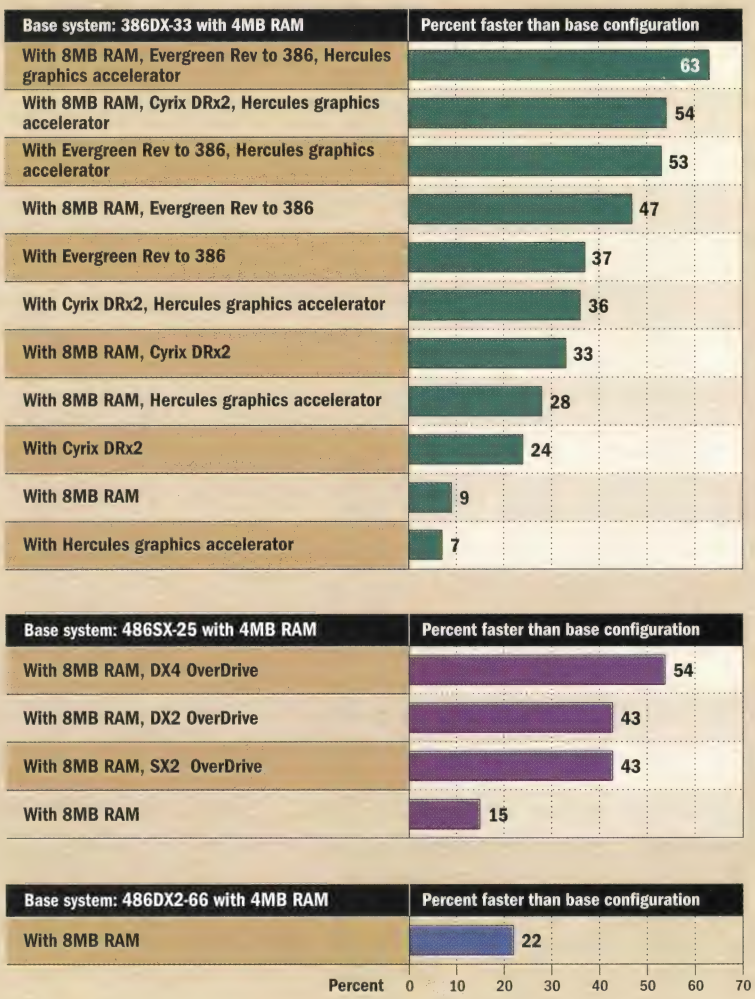
If you've got a couple hundred more to spend, you could also consider Intel's DX4 OverDrive chip. With the DX4 and 8MB of RAM installed, our 486SX-25 ran 54 percent faster, making it competitive with a brand new DX2-66. Cost of the upgrade: $450 for the chip, $140 for the extra RAM. Is $590 too much to spend on an upgrade? According to our tests, an SX-25 with 4MB of RAM is about half as fast as a new DX2-66 with 8MB. Considering that this DX2-66 would cost around $1500, the DX4 upgrade's price is dangerously close to, but still under, our 40 percent ceiling.

As for upgrading your 486's graphics, chances are your PC already has an adequate Windows accelerator, and even a new adapter may not outpace the existing card enough to warrant the $220 cost. But speed isn't the only reason to buy an accelerator: A new graphics board (like those listed in our Top 10 Graphics Boards) can give you more colors, higher resolutions, and less screen flicker than your current adapter. Of course, if for some perverse reason you run only DOS apps, you have no use for a Windows accelerator in the first place.

As should be clear by now, you need to choose your upgrade hardware carefully if you want to increase performance without throwing money away. But let's say you've decided to upgrade. What's your next step? Here's a breakdown of how to select and install upgrade components in 386 and 486 systems. The basic procedures are the same for all types of PCs, so the information should be pertinent no matter what type of system you own.

TEST REPORT

## Performance: Upgrades vs. Base Systems




**We wanted to find out how much upgrades improve overall system performance. For example, does adding memory improve performance more than upgrading the CPU? Here's how test scores for upgraded systems compare with those of the preupgrade base systems.**

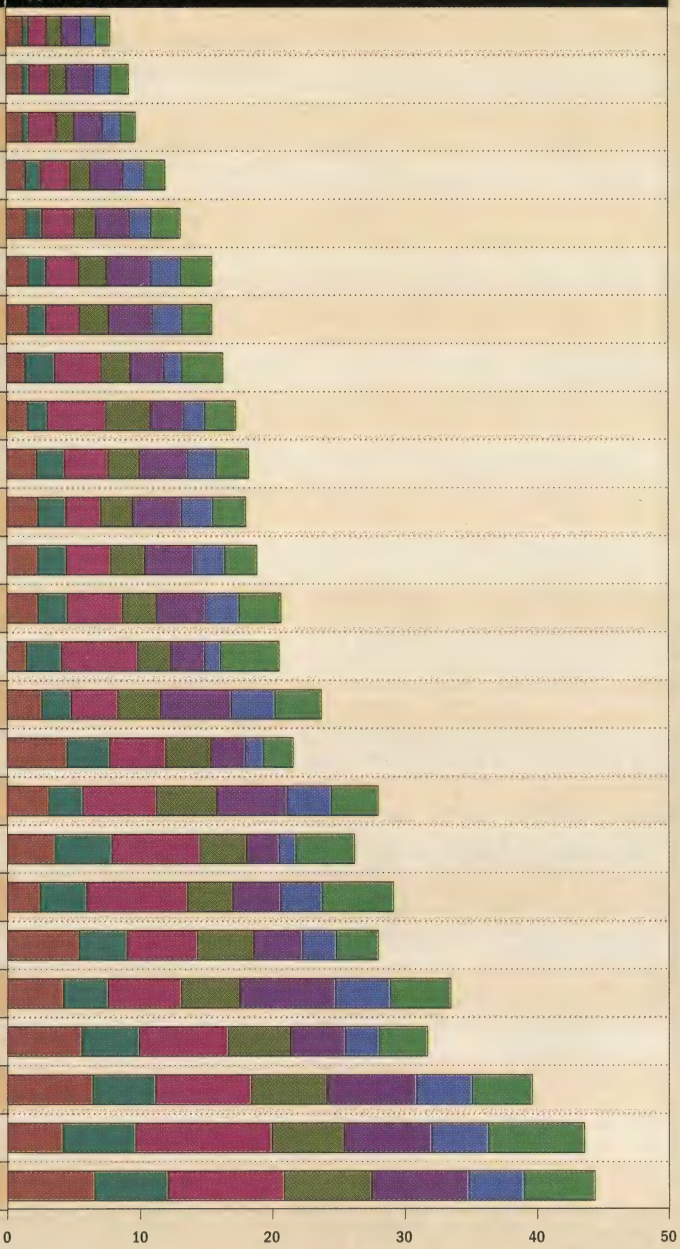
### Memory: The Easiest Upgrade Going

Adding memory is easy. Virtually all 486 systems—and most 386s—use standard SIMMs (single in-line memory modules), small circuit boards the size of a stick of chewing gum. They cost between $30 and $50 a megabyte (they're commodities, so prices fluctuate by the hour), and they're nearly as easy to install as a battery in your Walkman. The SIMM sockets are usually built into your motherboard: Just insert a SIMM into an empty socket at a perpendicular angle, lightly spread the side brackets that hold the SIMM in place, tilt the SIMM to a 45-degree angle (its installed position), and release the brackets. Treat the plastic SIMM sockets with care—in some systems they break easily, and replacing a socket is a major repair.

Before installing a SIMM, you need to determine which kind your system uses. SIMMs are identified by a brain-numbing array of specs—such as capacity, number of pins, speed rating, and whether they support parity checking (a type of error checking used by some systems). Fortunately, SIMMS are not as complicated as they sound, and your system manual should list most of the information you need.

# Performance: Upgrades vs. New Systems

| Overall performance rating | |
|---|---|
| 93 | Pentium-66 with 8MB RAM |
| 80 | Pentium-60 with 8MB RAM |
| 80 | 486DX4-100 with 8MB RAM |
| 60 | 486SX-25 with 8MB RAM, DX4 OverDrive |
| 55 | 486DX2-66 with 8MB RAM |
| 49 | 486SX-25 with 8MB RAM, DX2 OverDrive |
| 49 | 486SX-25 with 8MB RAM, SX2 OverDrive |
| 46 | 386DX-33 with 8MB RAM, Evergreen Rev to 386, Hercules graphics accelerator |
| 43 | 486DX2-66 with 4MB RAM |
| 43 | 486DX2-50 with 8MB RAM |
| 42 | 486DX-33 with 8MB RAM |
| 40 | 486SX-33 with 8MB RAM |
| 37 | 386DX-33 with 8MB RAM, Cyrix DRx2, Hercules graphics accelerator |
| 36 | 386DX-33 with 4MB RAM, Evergreen Rev to 386, Hercules graphics accelerator |
| 33 | 486SX-25 with 8MB RAM |
| 32 | 386DX-33 with 8MB RAM, Evergreen Rev to 386 |
| 28 | 486SX-25 with 4MB RAM |
| 27 | 386DX-33 with 4MB RAM, Evergreen Rev to 386 |
| 26 | 386DX-33 with 4MB RAM, Cyrix DRx2, Hercules graphics accelerator |
| 25 | 386DX-33 with 8MB RAM, Cyrix DRx2 |
| 24 | 386DX-33 with 8MB RAM, Hercules graphics accelerator |
| 22 | 386DX-33 with 4MB RAM, Cyrix DRx2 |
| 19 | 386DX-33 with 8MB RAM |
| 18 | 386DX-33 with 4MB RAM, Hercules graphics accelerator |
| 17 | 386DX-33 with 4MB RAM |




Recently recommended Top 20 systems in red

Time in minutes

Systems are arranged in order of overall performance from best to worst, based on the normalized, weighted scores from seven tests. A system may have a better overall performance rating than another system that took less time to complete our test suite.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Word 2.0 for Windows
Excel 4.0
Paradox 1.0 for Windows
Freelance 1.0 for Windows
WordPerfect 6.0 for DOS
1-2-3 release 3.4 for DOS
Paradox 3.5 for DOS

See this month's system review Test Report for details on these tests.

**How do upgraded systems compare with brand-new machines when it comes to raw performance? Using the test suite and scoring methodology from our system review Top 20s, we compare the overall test scores for our various upgraded systems against those of new PCs that we've recently recommended.**

The most important factor in installing a SIMM is the number of pins it contains, because the pins need to match the contacts in your sockets. Most 386s have eight 30-pin SIMM sockets, whereas an increasing number of 486 systems have 72-pin sockets. It's easiest to install 72-pin SIMMs, because you can usually add them one at a time and mix and match capacities—you can add 4MB SIMMs, for example, to a system that contains 1MB SIMMs.

By contrast, you must add 30-pin SIMMs *four* at a time, and all four must be of the same capacity. That means if you want to upgrade from 2MB of RAM to 8MB you have to throw out all your original RAM and replace it with eight 1MB SIMMs. Fortunately, going from 4MB to 8MB is easy—you just fill the four empty 30-pin sockets with 1MB SIMMs.

You also need to know whether your motherboard uses parity checking. Certain systems let you turn parity checking on and off in the BIOS setup utility, but you should

leave the setting where it is or the memory that's already installed may not work. Systems with parity checking and 72-pin sockets require 36-bit (also known as x36, read "by 36") SIMMs; nonparity systems with 72-pin sockets take 32-bit (x32) SIMMs. Parity systems with 30-pin sockets need 9-bit (x9) SIMMs, while nonparity systems with 30-pin sockets take 8-bit (x8) SIMMs. As usual, check your manual.

Last—and least important—is the memory speed rating, which indicates in nanoseconds (ns) how long the system must give memory to respond without errors. SIMMs are typically rated at 60ns, 70ns, or 80ns; the lower the number, the faster the memory and (usually) the more expensive the SIMM. You won't hurt anything by installing a 60ns SIMM in a system that asks for 80ns memory, but you're cruising for a crash if you plug 80ns SIMMs into a system that wants 60ns chips. Once again: Before you install new SIMMs, check the manual for your system's memory speed.

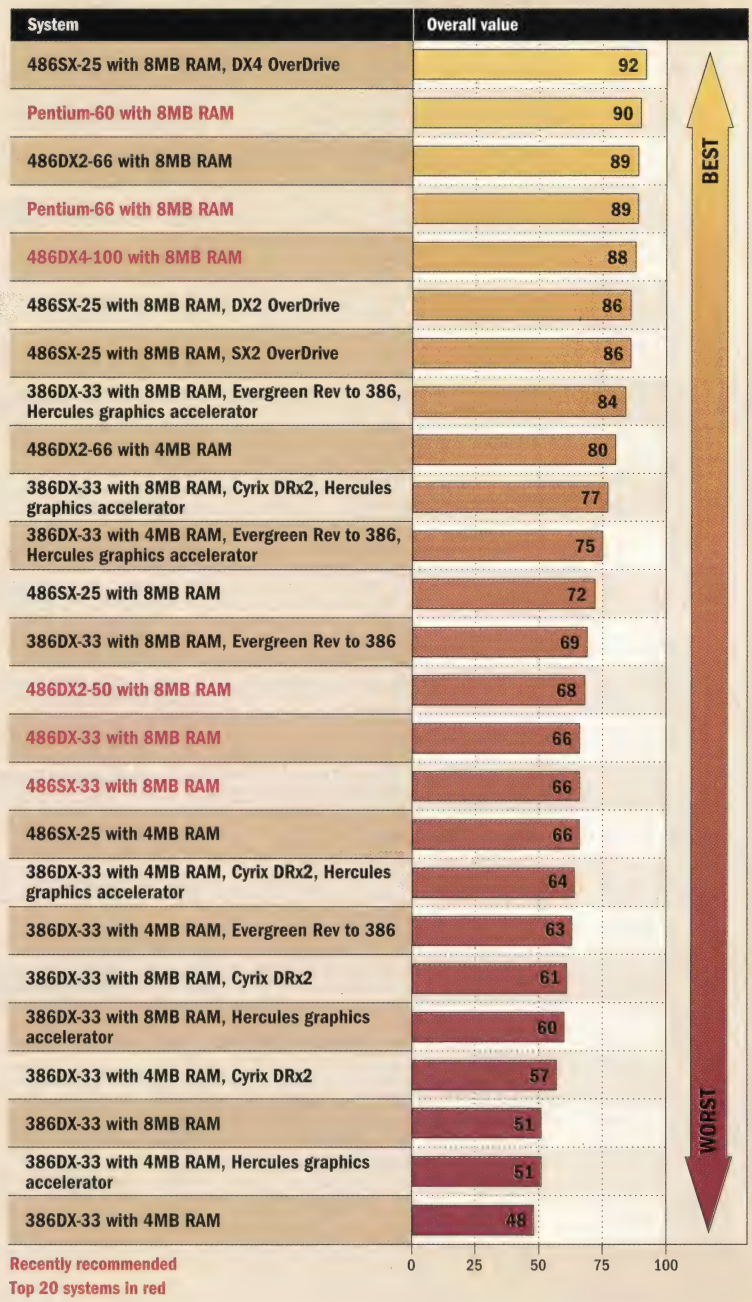
### The Incredible CPU Transplant

While matching new memory modules to your particular system can take a bit of work, selecting the right replacement CPU is relatively easy—with one exception.

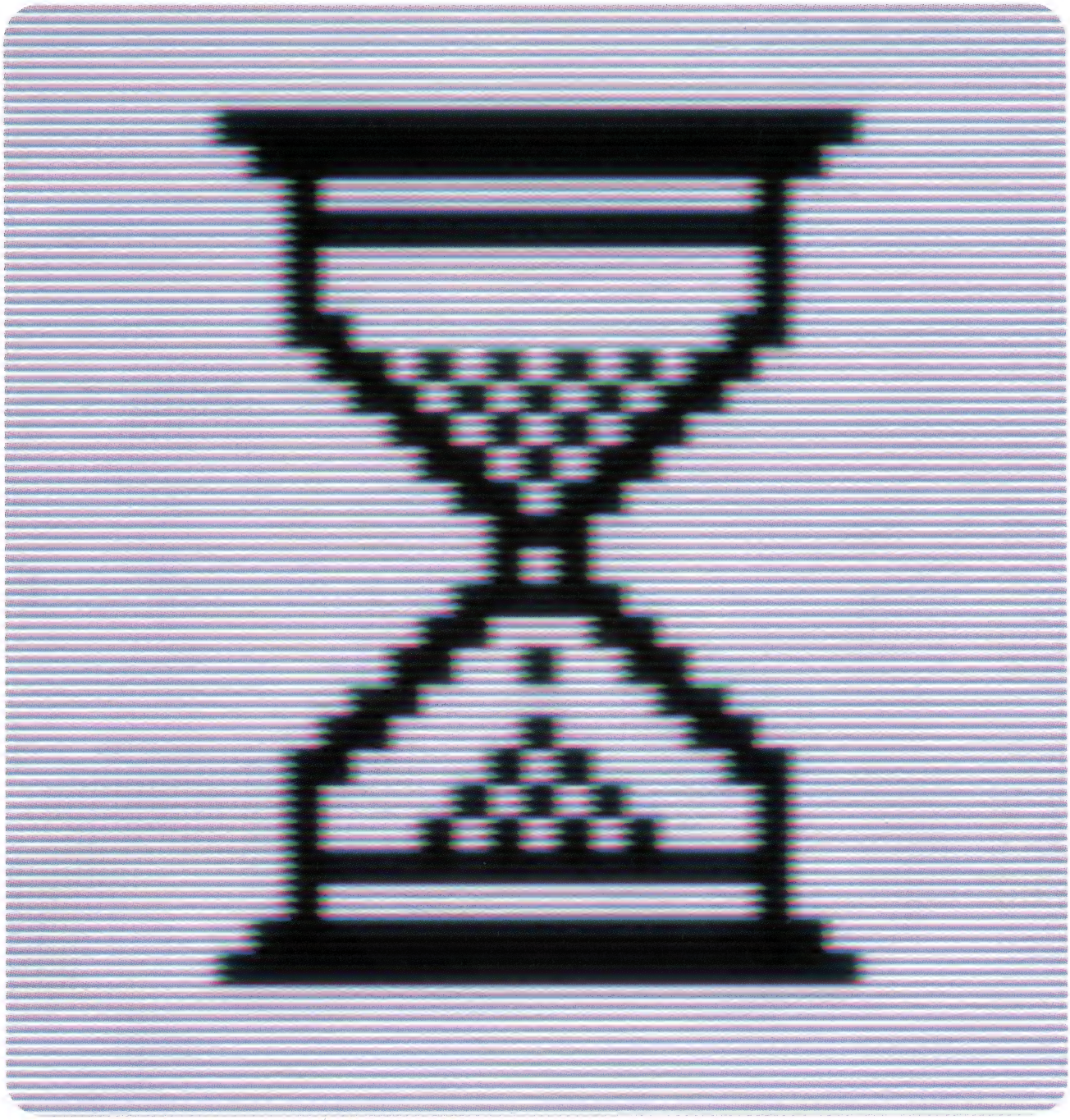
That exception is when you're upgrading a 486DX. Intel makes one version of the

TEST REPORT

## Overall Value: Upgrades vs. New Systems




**To find out how much value upgrades add, we rank the upgraded systems against ones PC World has recommended recently, on the price/performance scale we use in system reviews.**



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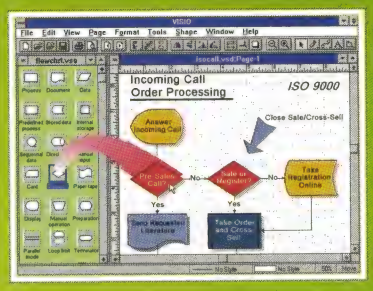


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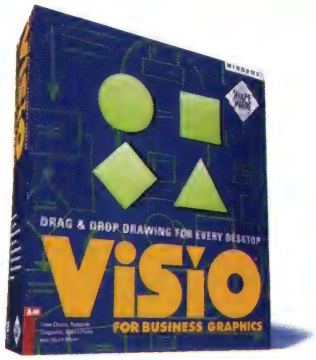


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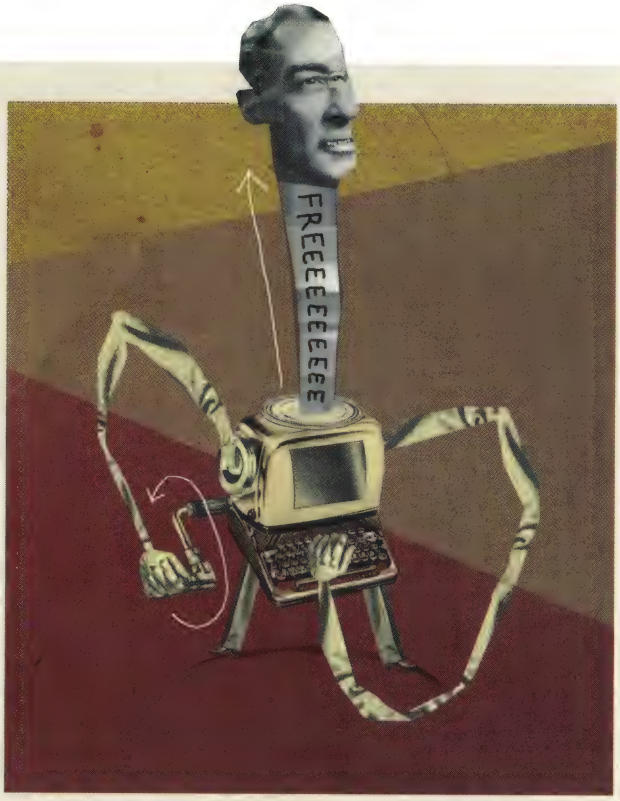
# Seven Free Upgrades




**There may be no such thing as a free lunch, but there are free upgrades. Here are seven quick and easy ways to squeeze more performance out of your machine without spending a dime.**

### 1. Use a memory optimizer.

Even if your PC has 16MB of RAM, if the first 640K is jammed with device drivers or other junk, system performance will suffer. You can give your RAM some breathing room by running MEMMAKER, a DOS utility that relocates these bits of software to upper memory. Just type *memmaker* at the DOS prompt and follow the instructions. If by chance MEMMAKER makes your system go haywire, you can always type *memmaker /undo* to get back to the original setup.

### 2. Get a new video driver.

Vendors of Windows accelerator cards revise their drivers all the time, and later versions are often faster than the originals. Most manufacturers will send you the new driver free if you ask, or you may be able to download it from the company's bulletin board system. Once you have the new driver, go to Windows' Program Manager, select *File • Run,* and type c:\windows\setup.exe in the Command Line box. Drop down the *Options* menu, select *Change System Settings,* scroll to the end of the Display list, and pick *Other display.* You'll be prompted to put a disk containing your new driver in the A: drive. Do so (or specify another location where you've stored the driver), click *OK,* restart Windows, and you're in business.

### 3. Create a permanent swap file.

If you don't already have one, a swap file is the most obvious way to speed up Windows. Go into Control Panel, double-click on *386 Enhanced,* and click the *Virtual Memory* button. If you see Temporary listed after Type, click the *Change* button and select *Permanent* from the Type list. To set the size of your swap file, accept the Recommended Size value suggested by Windows. Again, you'll have to restart Windows for the change to take effect.

### 4. Enable 32-bit disk access.

While you're in the Virtual Memory dialog box, you can enhance performance by checking the *Use 32-Bit Disk Access* option, but *only* if you're sure your hard disk supports the feature (check the manual). If you have an EISA or a local bus hard disk interface, check with the manufacturer of your system or drive before you turn on 32-bit disk access; otherwise, Windows may not run at all.

### 5. Defrag your hard disk.

DOS comes with a disk defragmenter, which like all such utilities speeds disk access by relocating files to contiguous blocks. To use the defragger, first make sure you have a current backup. Then, from the DOS prompt, type defrag and accept the default settings. Do this every week or so, and hard disk access will be slightly faster.

### 6. Turn on write caching—if you dare.

If you use SmartDrive, you may get a significant speedup by enabling write caching—which causes your PC to write data temporarily to memory instead of to disk. To turn on write caching for your C: drive, load AUTOEXEC.BAT into a text editor, locate the line that contains the SMARTDRV.EXE command, then add a space followed by the characters C+. You'll need to save the file and reboot for this to take effect. Beware, though: If your system crashes or you lose power while using write caching, you'll lose all the data in the cache and may screw up open data files too.

### 7. Upgrade your flash BIOS.

Not all PCs have a flash BIOS, but if yours does, you can give your system a nice little shot in the arm by installing the latest version of this basic system software. You can get a new BIOS the same way you'd get a new video driver: Ask the manufacturer for a copy, or download it from the company's BBS.

DX2 OverDrive that plugs into the original CPU socket and another that fits into a special OverDrive socket. The version of the DX2 OverDrive that plugs directly into the 486 socket isn't compatible with every 486DX machine. Fortunately, Intel has benchmarked hordes of DX systems to determine which ones are OverDrive compatible. To find out if your system is on the list, call Intel's fax-back line at 800/525-3019. If your machine is listed, the upgrade should work; if your system's on the list but the upgrade doesn't work, Intel will either resolve the incompatibility or refund your money. The DX4 OverDrive, on the other hand, should work in any 486 system.

Once you have the correct chip in hand, installing your new CPU is even easier than adding memory. If you have a 486SX system, your motherboard probably has an open socket waiting **continued on page 128**

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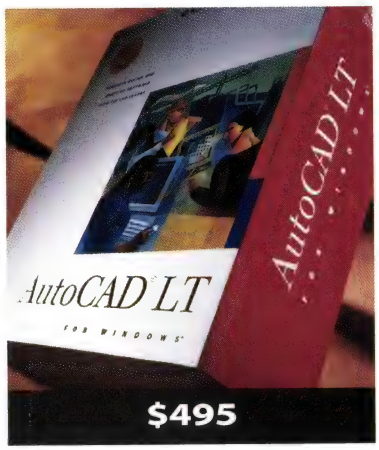
## And one inexpensive one.

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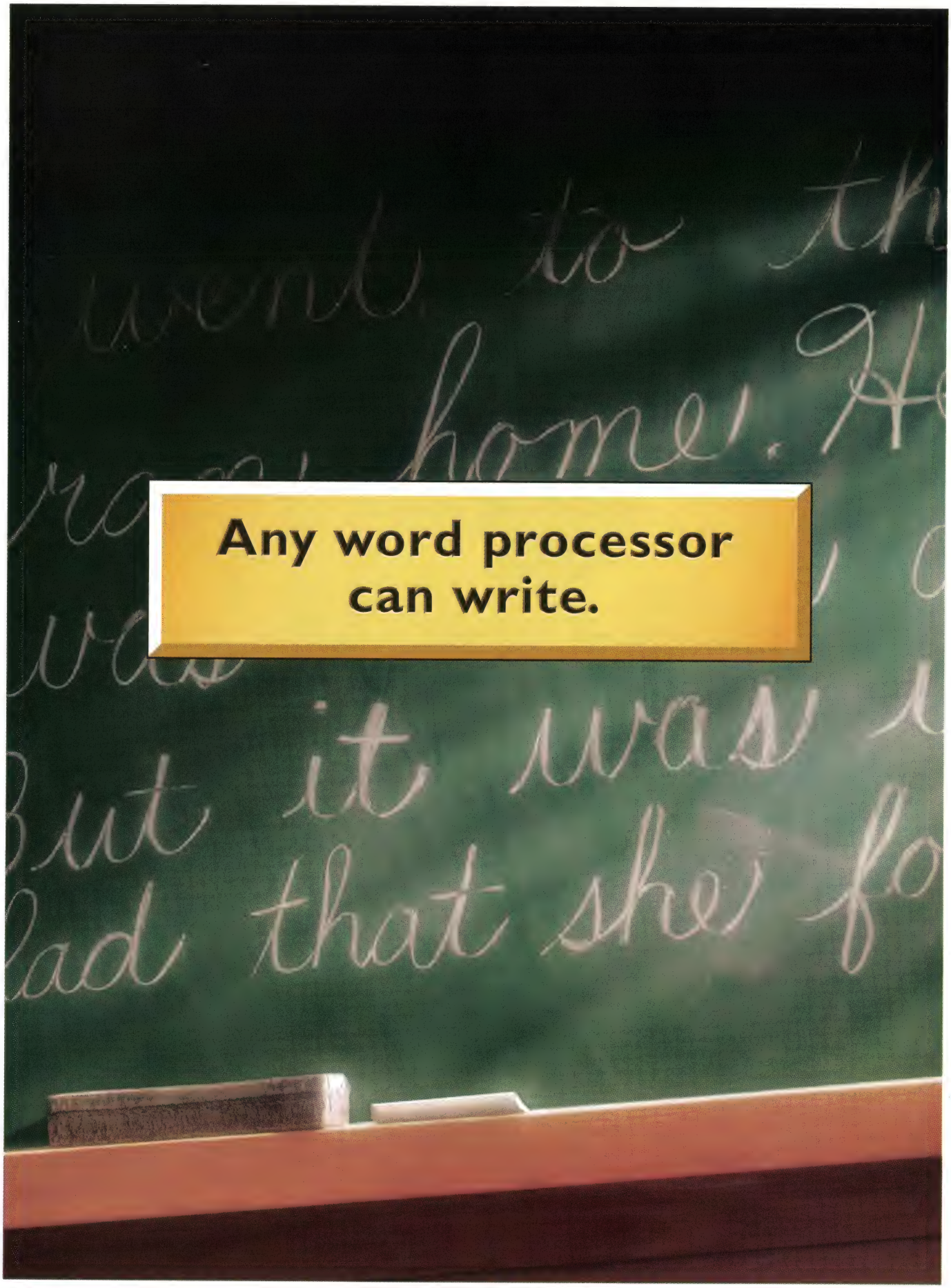


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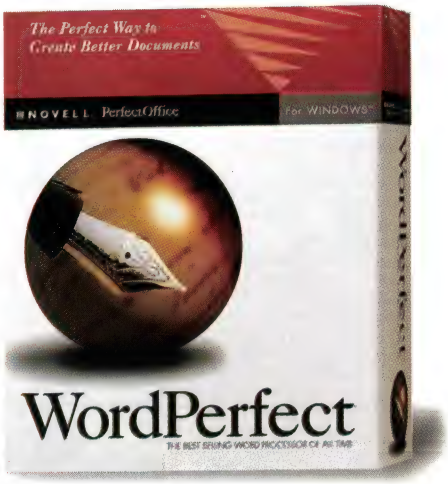


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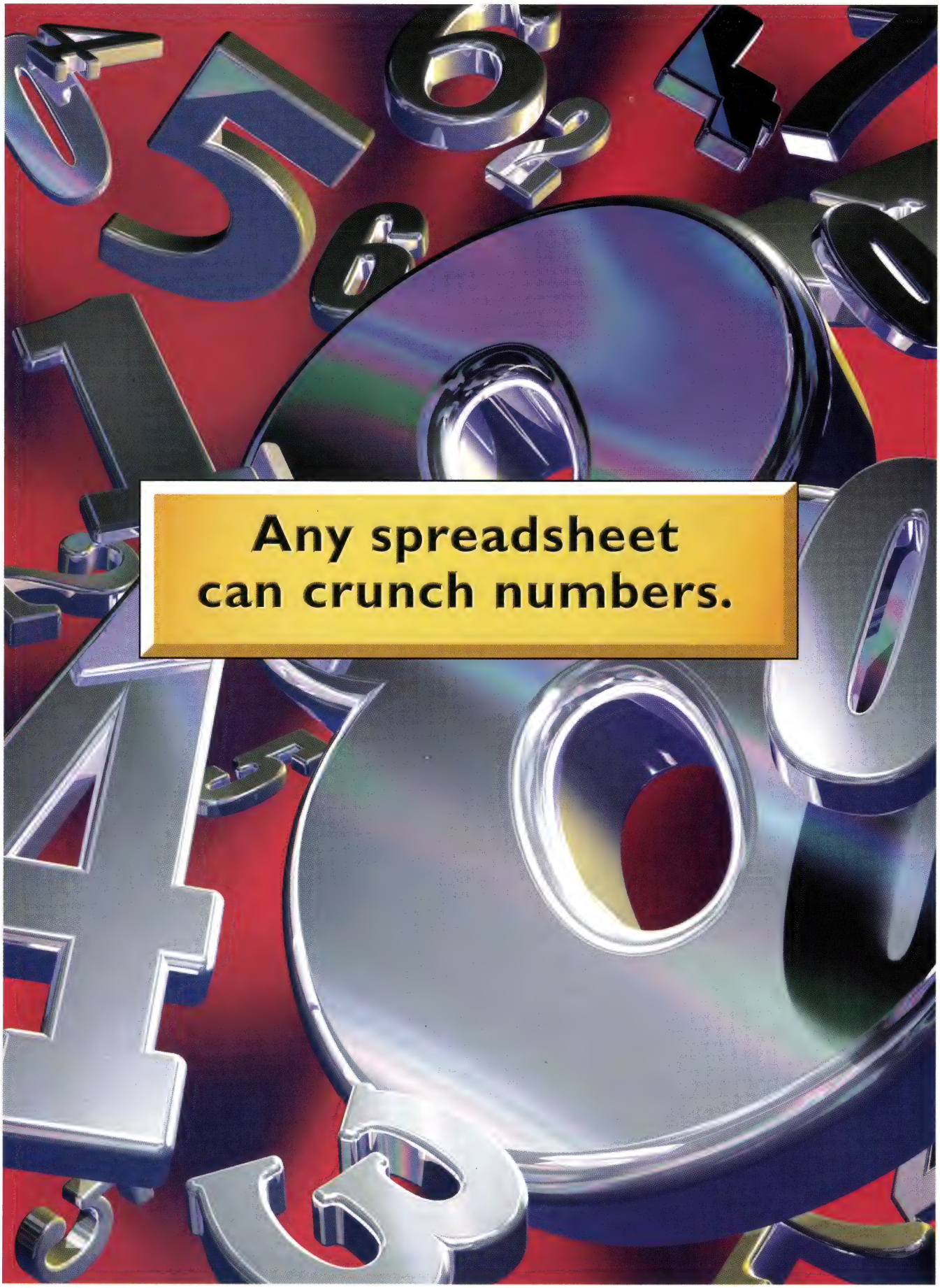


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for the OverDrive chip—just look for an empty CPU-size socket near the current processor. Line up the orientation pin on the OverDrive with the notch on the socket and plug it in—that's it, you've upgraded your system.

The job is a bit tougher on systems that don't have a special upgrade chip socket—that includes all 386DX, most 486DX and some 486SX systems—but it's still not all that hard. In these cases, you need to remove the original CPU first, then put the upgrade chip in the same socket. Pulling the original chip may require quite a bit of force, so be careful—the last thing you want to do is damage your motherboard. A chip puller—a pair of tongs specially designed to dislodge chips safely—should be included with your CPU upgrade kit.

We did run into a small problem installing the Evergreen Rev to 486 chip. The small circuit board piggybacked on top of the CPU was blocked by our system case, so the module wouldn't fit into the open socket. Fortunately, Evergreen has a socket rotator that let us twist the module 90 degrees and fit it into the socket.

Upgrading a 386SX is a different affair: Because most 386SX chips are soldered onto the motherboard, you can't just swap in a new CPU. That's why Cyrix created its 486SRx2 chip for 386SX systems. The 486SRx2 provides more or less the same capabilities as the 486DRx2. But instead of replacing the old CPU, the 486SRx2 sits piggybacked on top of it. However, check with Cyrix before purchasing this product—it doesn't work in all 386SX systems.

The Cyrix and Evergreen chips require one last installation step. Like 486 chips, these CPUs have a small built-in memory cache—an area of superfast memory that holds frequently used data so the CPU doesn't have to access main memory as often. To get this cache working, you need to run an installation utility that copies a small bit of software to your hard disk and adds a line to AUTOEXEC.BAT. In rare cases, a little troubleshooting and a call to tech support may be necessary.

### The Graphics Express

Should you decide to upgrade your 386 with a new graphics card, installation is usually a snap. The existing card probably has the same settings as the replacement, minimizing the chances of hardware conflicts with other devices. We had no difficulty installing the Hercules card in our 386 test system. We just pulled out the old card, plugged the new one into the same 16-bit slot, and installed the Windows driver. No settings needed changing, and everything worked just fine.

Your upgrade should prove just as smooth, as long as the new board fits the type of slots available in your system. For example, the Hercules board we tested is an ISA model, which means it fits into the bus slots found in virtually every PC. Many recent 486s also have local bus slots, which run at speeds close to the CPU's—much faster than the ISA bus's poky 8 MHz. If you have a local bus slot, that's where you want your accelerator card to go. Just remember that there are two types of local buses, VLB and PCI. The accelerator you choose must match the type of local bus slots in your system. And never install an ISA Windows accelerator in a system with local bus slots—unless you like the idea of a performance *downgrade*.

In some systems, however, the video circuitry is built into the motherboard and must be disabled to install a graphics card. How to tell if you have one of these systems? Check the back of your machine and see if the monitor is plugged into anything besides a connector on the rear bracket of an expansion card. If it is, your video is the built-in variety. To **continued on page 132**

## Expert Upgrades

# A New Dimension in PC Graphics

**Underwhelmed by PC-based multimedia and its herky-jerky video? I know I am. For a truly interactive experience, with graphics that border on virtual reality, you'll need to upgrade to a 3-D graphics accelerator card. When used with the emerging breed of 3-D–aware software (including the next version of Windows), these graphics speedup cards let you run around at will inside a virtual world, regardless of whether you're using a game, a layout app, or CAD software.**

**Matrox already sells a 3-D accelerator—the $449 MGA Impression Plus. In addition, 3-D boards from ATI, Creative Labs, and Diamond should be available early next year for $300 to $500. Like regular 2-D Windows accelerators, these boards plug into an expansion slot and perk up common Windows graphics operations.**

**But these cards also add custom hardware that speedily renders complex 3-D elements such as surface textures and light sources. The result: convincing 3-D images that update instantaneously.**

**Personally, I can't wait to try my favorite flight simulator with one of these boards. I'll just be sure to get a Dramamine patch first. • *ATI; 905/882-2600.* • *Creative Labs; 800/998-5227.* • *Diamond Computer; 408/736-2000.* • *Matrox Graphics; 800/361-1408.* Reader service no. 704**

**—Michael Desmond**

**A hard disk transplant could give your system a new lease on life. Replace a drive that's two or three years old, and you'll easily double the speed of loading files and applications.**

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We even designed the LTE Elite to make things easier in the office–with the SmartStation and MiniStation **expansion bases.** Both of these options feature built-in networking* and SCSI-2 capabilities for an instant desktop configuration–with ports for your full-sized monitor and keyboard. The SmartStation also adds expansion slots and bays, a spare battery charger and motorized docking.

intel inside

Of course, the LTE Elite also provides the peace of mind that comes with the Compaq **three-year warranty**** and free **24-hour helpline.**

If you'd like complete information, you're invited to visit a nearby authorized Compaq reseller. Or, to receive LTE Elite specifications via fax, simply give us a call at 1-800-345-1518, choose the free PaqFax option and select document #4023.

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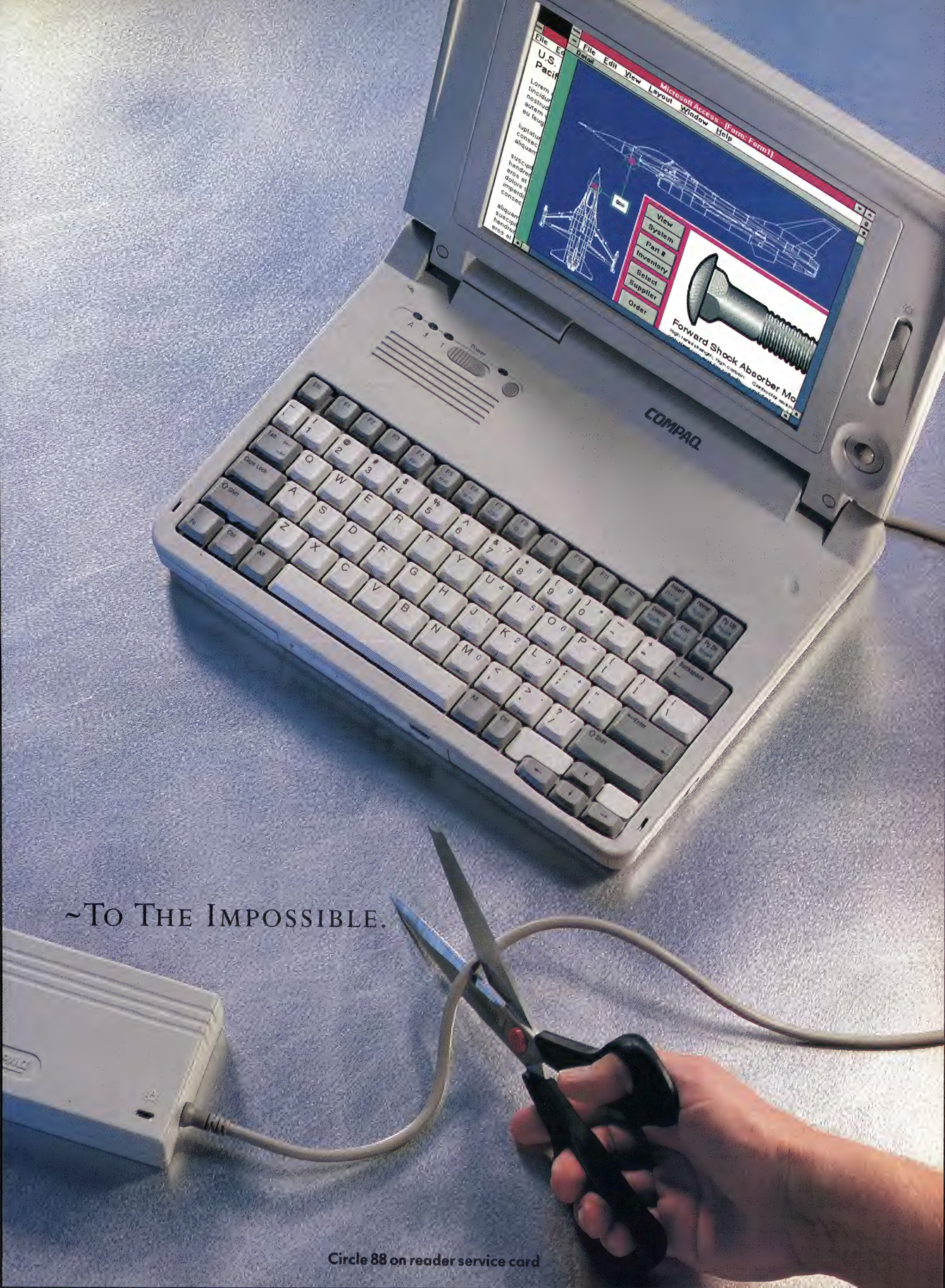



Circle 88 on reader service card

disable it, you move a jumper or flip a switch on the motherboard; consult your manual or call tech support to find out how.

### When You Need a New Hard Disk

Most people don't think of a hard disk upgrade as a performance enhancement. In reality, thanks to the snappy new technology in the latest drives, a hard disk transplant could give your PC a new lease on life. Replace a drive that's two or three years old, and you can *double* the speed of loading files and applications; factor in the added speed of your Windows swap file, and a new hard drive could change your computer's overall performance substantially.

Still, the main reason for adding or replacing a hard disk is lack of space. If your hard disk is starting to feel as crowded as the freeway at rush hour, the news is good: You can now easily find a 340MB hard disk for around $200. That's plenty of room for most Windows users, but if you want more (multimedia is on the march, after all), a 540MB drive will only cost you another $100 or so.

Should you chuck the old drive, or install a new one alongside it? The answer depends on the age of the existing drive. If you have a 40MB or even an 80MB hard disk, it's probably at least three years old, and could start showing signs of decay any minute now. An old drive that starts producing lost clusters or cross-linked files on a regular basis may be trying to tell you something; you can detect these errors by running DOS's ScanDisk or The Norton Utilities' Disk Doctor. If your old hard disk gives you any "seek error" messages, replace it pronto.

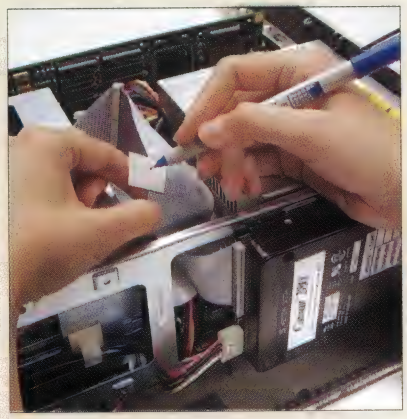
The type of drive you should buy depends primarily on the hard disk interface—the circuitry the PC and drive use to communicate with each other. If your current hard disk is hooked to the motherboard by a 40-wire ribbon cable, you have an IDE interface, so you should buy an IDE drive. If your hard disk is connected by a 50-pin ribbon cable to an interface card, then it's a

# How to Replace Your Hard Disk

**Hang on to the same old system for more than a couple of years, and eventually you'll need a bigger hard disk. If you hate the idea of opening up your PC, you can pay a service person to install the new drive. If you want to save money and reduce downtime, however, do the job yourself. It's pretty easy if you follow the steps carefully.**

**This guide shows you how to replace an IDE drive, the most common type of hard disk. But before breaking out the tools, make sure you buy the right size disk for your PC's empty drive bays. Hard disks come in two sizes: 3½ inch or 5¼ inch. You can mount a 3½-inch drive in a 5¼-inch bay, but not the reverse. Also note that hard disks larger than 540MB are often 5¼-inch, full-height drives, and many compact desktop systems have only half-height bays. If your PC lacks a bay that's about 6 by 3 inches, it can't accommodate a drive this big.**

**Once you've got the right hard disk, the following instructions should help you make the right connections.**



*MAKE A NOTE of how all those flat gray ribbon cables connect to various drives.*

### Installing the Drive

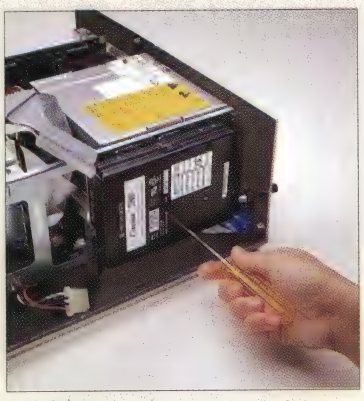
**1. Back up your entire hard disk using a program that lets you selectively restore files and directories. The possibility of something going fatally wrong is slim, but why take chances? Besides, backing up the old drive and restoring the files to the new one is the easiest way to move data from one drive to another.**

**2. Next, start your system's setup program. Usually you call it up with a key combination: <Ctrl>-<Alt>-<Esc>, <Ctrl>-<Alt>-<Insert>, and <Ctrl>-<Alt>-S are common variations. Or try pressing <Esc> or one of the above combinations while your system starts up. Then look for an entry that says 'Hard Disk 1' or 'Fixed Disk 1,' highlight it, and press <Enter>. Now write down the following information about your existing hard disk: number of cylinders, number of heads, preformatted capacity, number of sectors per track, and starting cylinder for write precompensation. Finally, unless it is autoconfiguring, make sure you have all this information for the new drive as well (check the documentation).**

**3. Turn off your PC and open it up. To access the free drive bay, you may need to temporarily unplug and clear away the flat gray ribbon cables that connect other drives. If so, make sure to note exactly how those cables were hooked up so you can reconnect them later. Some drive cables have a red stripe along one edge to indicate orientation.**

**4. Remove your old hard drive. Along with unplugging its cables, you'll need to unscrew it on both sides. Handle it gingerly: If you can't get the new drive to work, you'll want a working drive to fall back on.**

**5. Slide the new hard disk into a free bay and use the screws that came along with the drive to secure it to the drive cage. If you need to install a 3½-inch drive in a 5¼-inch bay, attach the drive rails (these are supplied with most 3½-inch drives) before inserting it.**



*SECURE the new hard disk to the drive cage with the screws provided.*

PHOTOS: JOHN GREENLEIGH

SCSI drive, and your replacement drive should be a SCSI too.

If you have an older 386 system, you may see two ribbon cables connecting the hard disk to a controller card. That means you have either an AT, an ESDI, or an ST506 (also known as an MFM) drive. Don't waste time looking for a replacement hard disk to match the controller card—you probably won't find one. If you do, it will likely be slower than an IDE or a SCSI model—and when you finally kiss your old 386 goodbye, you may not be able to transport the old drive to your new system. You'll have to spend about $50 on an IDE or a SCSI interface card, but it's 50 bucks well spent.

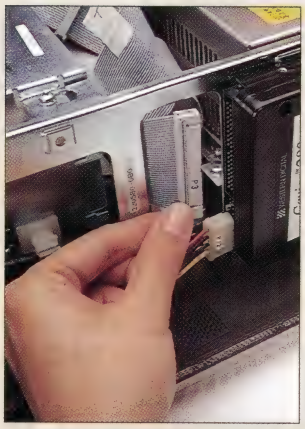
Unlike the other upgrades in this article, a hard disk's installation can get a little complicated; see the sidebar "How To Replace Your Hard Disk" to get a general idea. If you'd prefer to avoid this job, many local dealers will do it for a reasonable fee.

### The Upgrade Decision

The older your PC, the less sense it makes to upgrade. You have to replace more parts —and spend more money—just to bring it up to par. Even then, its reliability will never match that of a new system. On the other hand, if you have a system so slow it's affecting your productivity, and you or your company can't afford a new one, don't just sit there—upgrade! Target the components that are hurting you the most, then shop carefully for substitutes.

Done selectively, upgrading can pay off. Your improved system will be able to run those new programs you've been dying to use, and you'll be able to postpone, for a little while at least, the day when your PC heads to that high-tech junkyard in the sky.

*Eric Knorr is a contributing editor for* PC World *and the editor and principal author of* The PC Bible *(Peachpit Press, Berkeley, California, 1995). Michael Desmond is an assistant editor and Steve Bass and Daniel Tynan are contributing editors for* PC World.



*CONNECT the data cable to the new hard drive.*

**6. Locate the flat gray data cable that was originally hooked to your old hard disk and plug it into the rear of the new drive (most hard disk ribbon cables have at least two connectors). If you can't figure out which one of the cables connected your hard disk, remember that IDE cables have 40 wires and are usually connected directly to the motherboard. The connectors on the drive and the cable are keyed so that you can't plug the two components together the wrong way.**

**7. Find a free power connector—an unconnected white plug that is attached to a bundle of four wires sprouting from the power supply. Plug this connector into the power socket located on the back of the new hard disk.**

**8. Replace your PC's cover, but don't screw it on yet. If you can't get the new drive to work, you may need to check your connections or—in the worst case—reinstall the original drive.**

### Setting Up the Drive

**So much for the mechanical stuff. Now you're ready to help your IDE drive and PC get acquainted. Here's how to proceed.**

**1. Check to see if the new drive is autoconfiguring. If it is, start the PC's setup utility, select the hard drive autoconfigure option, then save and exit setup.**

**2. If your drive isn't autoconfiguring, start your PC's setup utility, and find either the 'Hard Disk' or the 'Fixed Disk' entry.**

**3. When you make your selection, the PC's drive table should appear. This lists the drive types your system BIOS officially supports, followed by the number of heads, cylinders, and so on for each type. If any of the types precisely match the information you wrote down about the new drive, you're on easy street: Just enter the appropriate drive type number, save your setup configuration, and exit setup.**

*PLUG the power connector into the new drive's power socket.*

**4. If you can't find a match, select a user-definable drive type—usually Type 0, Type 47, or Type 99. Fill in the blanks with information about your new drive, save the configuration, and exit.**

**5. If you can't find a matching or user-definable drive type, you have two possible choices. First, you can buy a hard drive installation utility, such as Micro House's EZ-Drive or Ontrack Computer Systems' Disk Manager; some hard disks include one of these programs in the box. Just boot from drive A:, swap in the utility's disk, and run the automatic installation routine.**

**Your second choice is to select a drive type with parameters as close as possible to those of your drive. However, this method inevitably wastes space. And remember: If you choose a drive type with greater capacity, more heads, or more cylinders than the new hard disk, you may damage the disk.**

### Restoring Data on the Drive

**All that's left now is setting up your hard disk to store data—partitioning it into logical drives (C:, D:, E:, and so on) and formatting them. DOS 6.0 and later versions lead you more or less effortlessly through this process: Just insert Disk 1 in drive A:, turn on your machine, and follow the prompts. But if you install a later version of DOS on the new drive and want to back up your old hard disk to the new one, make sure you configure the backup utility so it doesn't copy your old DOS version to the new drive.**

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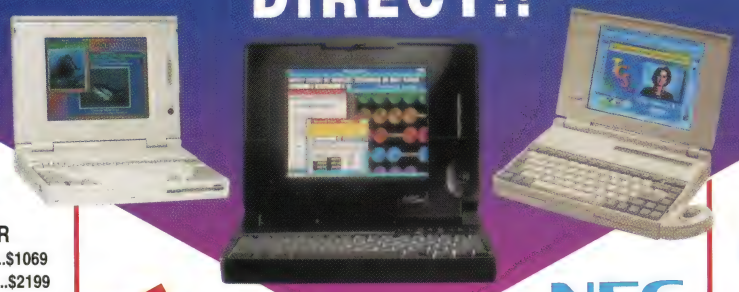

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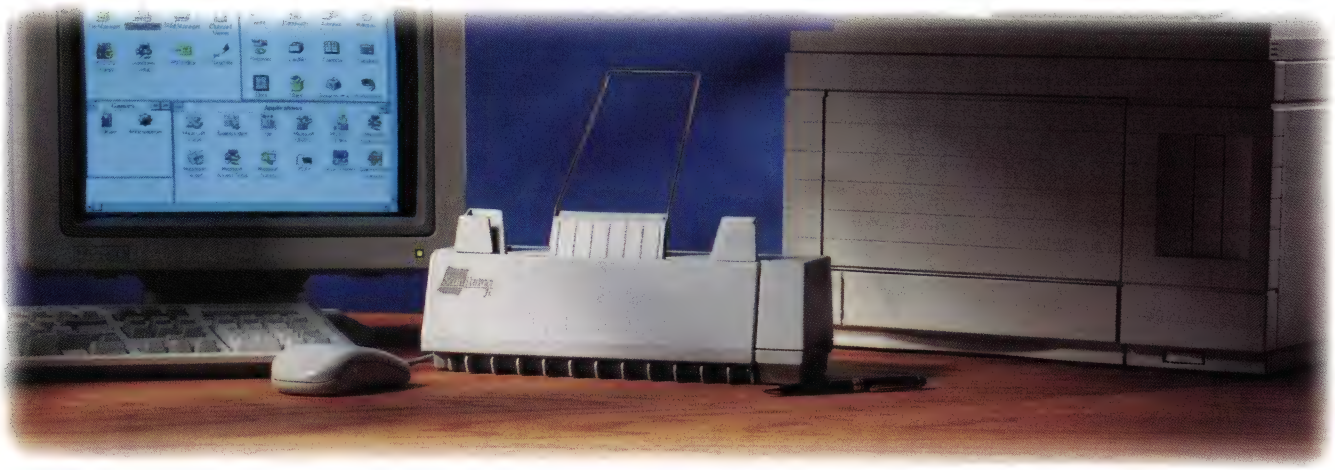

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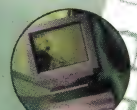
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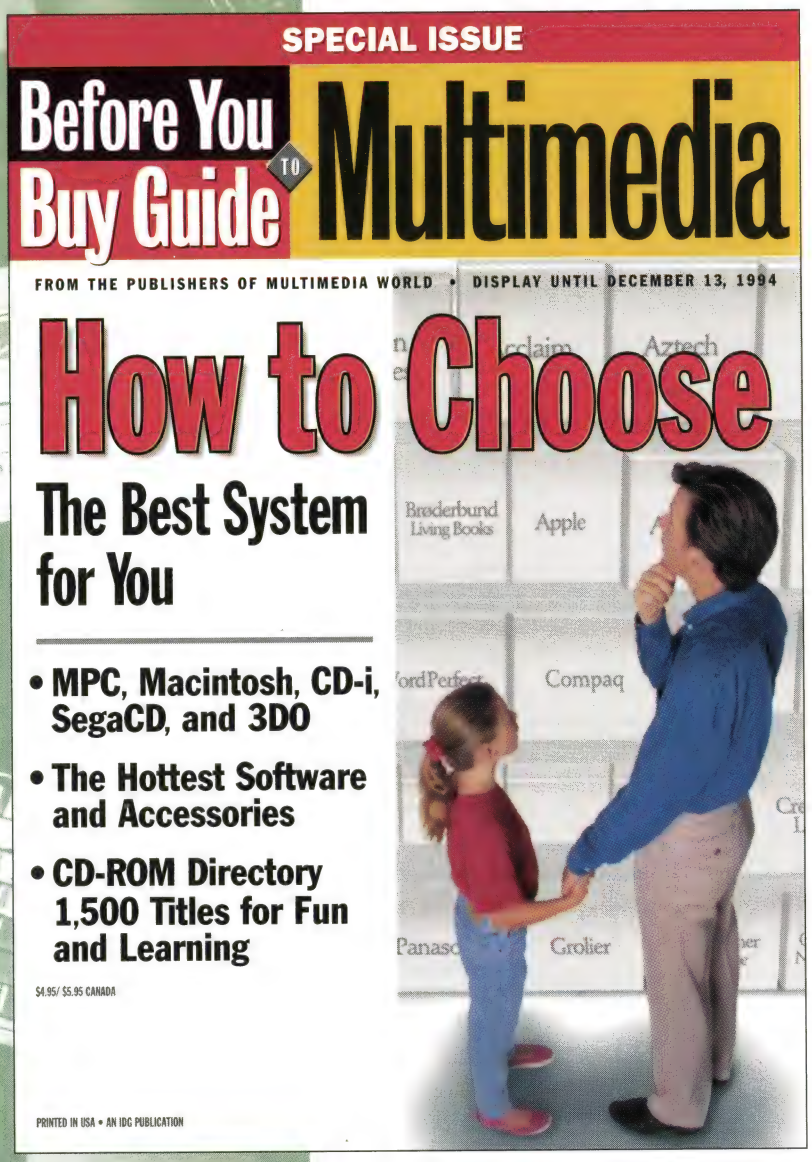


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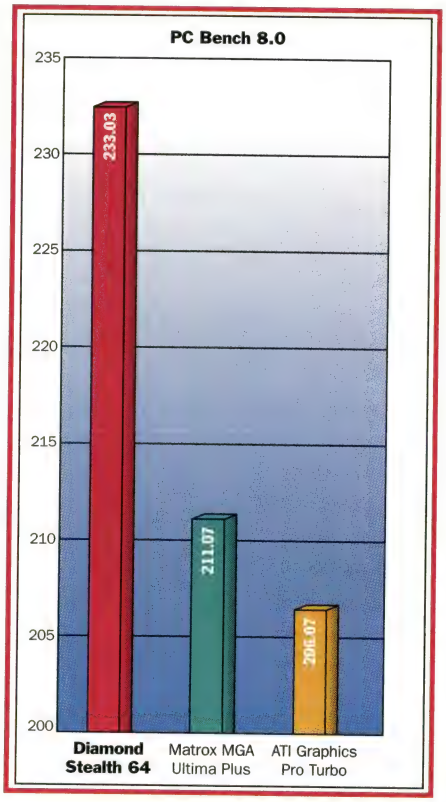


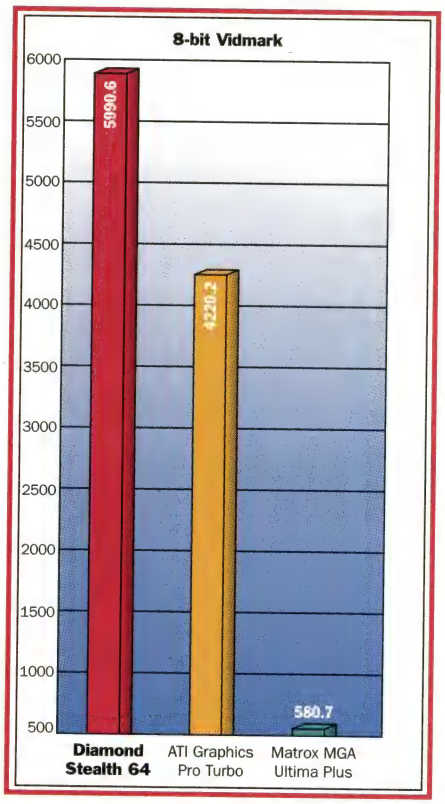


Source for test results: *Computer Shopper*, September 1994, using PC Bench 8.0 on a Diamond Multimedia Stealth 64 PCI using Micron Magnum 4100 486DX4-100MHz system with DOS 6.2, 32MB RAM, and 256k cache. *InfoWorld*, July 25, 1994, VidMark 8 bit test.

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Windows Sources Australia — Editor's Choice, August 1994

PC World Best Buy — Best Buy September, 1994

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# WINDO

SECOND LOOK

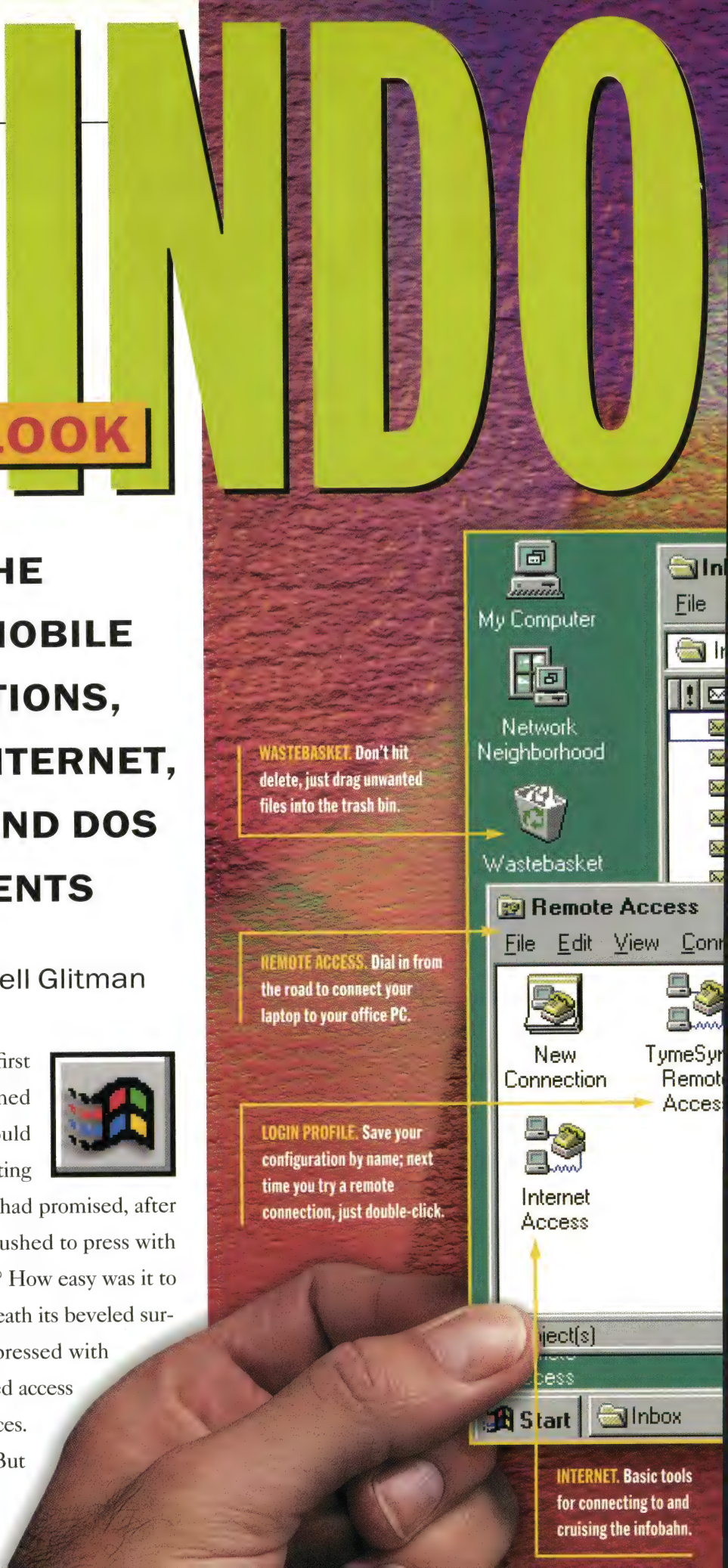
## BEHIND THE INTERFACE—MOBILE COMMUNICATIONS, INFO CENTER, INTERNET, MULTIMEDIA, AND DOS ENHANCEMENTS

By Steve Fox and Russell Glitman



Back in August, we took our first look at Chicago, now renamed Windows 95. Thinking it would be unleashed on an unsuspecting public in late '94 (Bill Gates had promised, after all), we got hold of a beta copy and rushed to press with our first impressions: How did it feel? How easy was it to navigate? What mysteries lurked beneath its beveled surface? We admitted that we were impressed with its look and feel and with its simplified access to files, applications, and other resources.

Months later, we're still impressed. But




**WASTEBASKET.** Don't hit delete, just drag unwanted files into the trash bin.

**REMOTE ACCESS.** Dial in from the road to connect your laptop to your office PC.

**LOGIN PROFILE.** Save your configuration by name; next time you try a remote connection, just double-click.

**INTERNET.** Basic tools for connecting to and cruising the infobahn.

# WS 95

WINDOWS 95 PREVIEW

View Tools Fax Compose Help

| From | Subject | Received | Size |
|---|---|---|---|
| Todd Warren | Info Center Backgroun... | 5/27/94 1:24AM | 38K |

New Connection Wizard

Type the name of the remote computer:

Corporate HQ

Select a modem:

Megahertz XJ2144 V.32bis PCMCIA Modem ((

Configure...

Battery Meter

Power Status

Battery level: high

100% remaining

OK

Steve's Briefcase | Remote Access | 1:57 PM

**INFO CENTER.** A central place for storing and accessing E-mail, faxes, and voice messages.

**WIZARDS.** Automated advice is everywhere. This New Connection Wizard steps you through configuration options.

**PLUG AND PLAY.** Windows 95 takes its best shot at identifying your modem and other peripherals.

**BATTERY METER.** The operating system keeps close tabs on your hardware.

**BRIEFCASE.** Drag-and-drop file updating keeps the files on your mobile and desktop PCs in sync.

**UNPLUGGED.** When you switch to battery power, this Taskbar icon changes from a plug to a battery.

PHOTOS: HANDS, STEPHEN MARKS/THE IMAGE BANK; BACKGROUND, PIERRE-YVES GOAVEC

we're also growing impatient. (In August, Microsoft quietly announced that the upgrade wouldn't get out the door until sometime in the first half of 1995.) So now that we've had some more time—and gotten our hands on an even more current beta copy—we're ready to burrow beneath the pretty exterior to explore some of Windows 95's essential components. For this go-round, Senior Editor Steve Fox goes mobile, examining Windows 95's communications features. Senior Editor and inveterate Internet surfer Joe Abernathy looks at the operating system's built-in Internet faculties and compares them with those found in Warp, the upcoming version of OS/2. Then, Executive Editor Russell Glitman tackles multimedia, and to test Windows 95's vaunted ability to do the DOS thing, he plays with a series of mission-critical DOS-based productivity applications—Wolfenstein 3D, Rebel Assault, and Wing Commander.

One reminder: We tested beta software, and as typical of prerelease software, not everything works. Features, functions, and component names are subject to change.

## Under Construction

Windows 95 is a work in progress. Here's an update on some key features.

**Multimedia:** **Your PC will do more than a song and dance when this is ready. It's not ready yet.**

**Plug and Play:** **We're still waiting, but the promise of instant configuration is enticing.**

**DOS:** **It's actually easy to use. The one-stop properties box, a graphical tool bar, and drag and drop to the C> prompt make this a winner.**

**Networking:** **Name your network connection, and Windows 95 promises to make the link. We're seeing progress, but is it the light at the end of the tunnel?**

**Internet:** **It helps get you onto the highway, but OS/2 does it better.**

**Virtual Device Drivers:** **Sounds arcane, but these free more conventional memory. Great for DOS games.**

**CDFS:** **The new CD-ROM File System. Faster throughput allows larger video windows and audio synchronization. Still in development.**

**Shrink-wrap:** **Christmas 1994. No, early 1995. Would you believe spring 1995? Look for the new version of OS/2 before Thanksgiving.**

## On the Road Again

As I packed for a recent one-day business trip, I was feeling brave: One change of clothes, my toothbrush, and an IBM Thinkpad with nothing loaded but a beta copy of Windows 95 and a few critical apps and files. If I couldn't get in touch with the home office, I knew I could always blame Microsoft and its bug-infested software. No crutches, no backup plan (except maybe the phone, but that would be a last resort).

On-the-road computing starts with hardware, and Windows 95 takes great pains to keep tabs on your computer and its peripherals, courtesy of a technology called Plug and Play. If you're using a laptop with a PCMCIA modem, for instance, you plug in a card and Windows 95 will "autodetect" the device, identify it, and flash a New Device Wizard up on the screen. A few clicks and you're ready to telecommunicate.

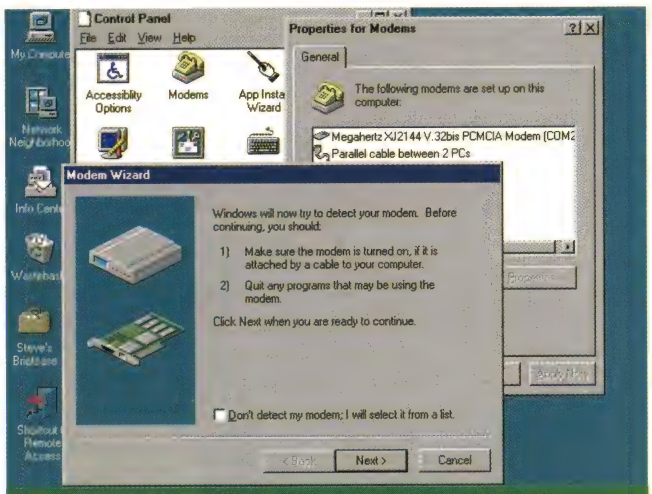
Well, that's how it worked when I played with Windows 95 at the Microsoft offices in Redmond, Washington. My own experiences have left me somewhat less sanguine. Windows 95 recognized some devices instantly; others gave it fits. My laptop, which worked as advertised with a Socket EA+ PCMCIA Ethernet adapter, failed to detect a Megahertz PCMCIA modem. It's worth repeating that beta software is innately funky, and in a demo at Redmond, a similar Megahertz modem worked like a charm. The problem is, the operating system, the peripherals, and the computer BIOS all need to play by the same rules to implement Plug and Play accurately. It will happen, but don't expect miracles overnight.

After the vagaries of Plug and Play, Windows 95's other accommodations to laptops seem rock-solid. For instance, the Taskbar now sports an icon that changes from a plug to a battery when you switch your laptop to battery power. A double-click of the battery icon brings up a meter indicating how much juice you have left. And if your notebook has a suspend feature, that option adds itself to the Start menu.

To get a better handle on communications hardware, Microsoft is pushing Telephony Applications Programming Interface, a common set of services that applications can use to interact in a consistent way with modems, phones, fax boards, and the like. TAPI handles telephony operations like establishing, answering, and terminating calls and negotiating access to COM ports and devices. Microsoft has declared that all Windows 95-approved communications applications and peripherals should be TAPI-aware, and from all indications, developers of hardware and software for voice mail, fax, teleconferencing, E-mail, and other communications are falling in line.

## Farewell, Floppy Shuffle

Every traveler needs a briefcase. And if you're toting a laptop, Windows 95 will provide you with one—a Briefcase for storing




CAN I SEE YOUR ID? The Modem Wizard tries to identify your hardware and configure it for you.

files you'll use on the road. Create the Briefcase on your main machine (a no-brainer), drag and drop needed files and folders into it, and drag the entire Briefcase to a floppy.

When you return home with your edited files, pop the floppy back into your main machine, double-click the Briefcase icon, and choose to update all or some of the files. In the beta we tested, the Briefcase is still very buggy, and I was frustrated when I had more than a floppy's worth of data (a message told me there wasn't enough disk space and suggested I delete something from the floppy), but I can see the potential in this technology. After all, I've been doing the floppy shuffle for years—poring over file dates and sizes when transferring data between my home and office machines, and then instructing Windows to copy over some files and leave others intact.

One catch: Windows 3.1 doesn't recognize Briefcase folders created in Windows 95; you'll need Windows 95 everywhere for the Briefcase to become a practical solution.

## Home in New Guinea

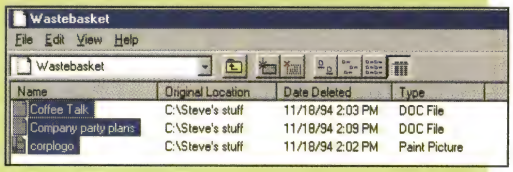
Integration is the name of the game among the other built-in communications software—fax (essentially the same as in Windows for Workgroups 3.11), HyperTerminal, and remote mail. For end users, that translates into fewer hassles getting applications to work with phones and each other and less time spent configuring software. For instance, in Dial Helper, you create a location profile (say, "Hotel in New York" or "Home in New Guinea"), enter the country code (with predefined entries for locales from Argentina to Venezuela), area code, prefixes required, and even calling card information (again, there are loads of preset numbers). Whenever you take to the road, choose from your defined locations to tell Windows 95 where you are; the information automatically goes to any Windows applications that need it.

The idea isn't exactly radical: I use cc:Mail Remote, which supports similar profiles, but they work only with cc:Mail. Using Windows 95, I've really appreciated not having to reenter prefixes and other site-specific information each and every time I switch applications.

Features aside, the real measure of Windows 95's communications will be stability. Microsoft claims that it's scrapped the underlying architecture that made Windows 3.1 so notoriously flaky with communications—the dropped connections, the inability to multitask consistently, the frozen screen of death. Windows 95, Microsoft officials claim, is built as a solid communications platform from the ground up. Unfortunately, beta software is no place to test such claims fully, though the initial results do look positive. I've been running the 32-bit HyperTerminal—the new version of Windows 3.1's much-derided Terminal—and, bugs aside, I've been generally satisfied, especially with its multitasking. I've consistently been able, for instance, to dial in to a BBS, begin downloading a file, and switch away to work on a spreadsheet while the download chugged away in the background.

These sorts of online exercises, however, point up another problem: info glut. Typical users can spend hours every day launching, checking, and closing their various E-mail, fax, and workgroup applications. Windows 95's solution is the Info Center, a kind of universal in-box/out-box for accessing, managing, and exchanging all your communications—E-mail (network and online), faxes, voice mail, and forms. Mail, fax, and other messaging software and services written to work with Windows 95 will plug into the Info Center, so anything sent to your PC can be routed to it automatically. And, of course, you'll be able to send messages, faxes, and the like directly from the Info Center. Its address book will include E-mail addresses, plus any information you would

## About Time...




**Wastebasket.** Drag and drop to delete. Files are stored until you empty the wastebasket. OS/2 and Macintosh have it, so why not Windows?

## This Must Be DOS 7.0

**Microsoft not only designed Windows 95 for the future, it also found ways to improve upon the past by providing some significant enhancements to DOS and creating what appears to be an almost seamless environment for Windows and DOS applications. You can launch DOS applications with the Start button, and open Windows apps from the DOS prompt: Just type Start followed by the name of a file at the C> prompt, and you'll launch the associated application. You can even drag and drop a Windows document onto a DOS window, and the file and path names will appear at the prompt.**

**Before you even begin to use DOS, you'll be struck by the change in its appearance. DOS now displays a limited tool bar with icons for mark, copy, paste, display full-screen, run exclusively, and run in background, plus a drop-down menu for font size and style. Hover help boxes, becoming popular in Windows applications, explain each icon's function. A new "verbose" (/V) mode, shows when a file was last accessed or modified, and the amount of memory allocated to it.**

**Microsoft now uses TrueType fonts in DOS, and the autosize feature scales the fonts as you resize a DOS window. The links between Windows 95 and DOS are also visible from the C> prompt. Type dir and you'll see a listing that not only includes the eight-dot-three file names and extensions, but also shows any long file names you have created in Windows.**

**If there is ever to be such a thing as DOS 7.0, this is it. —Russell Glitman**

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otherwise keep in a contact manager—names, phone and fax numbers, addresses, and so on. Competing E-mail packages will work with it, though the Info Center was specifically designed to take advantage of Microsoft Mail (not exactly a coincidence).

The convenience of viewing everything in one place is compelling. But will people voluntarily abandon the variety, functionality, and comfort of cc:Mail, WinFax Pro, Act, and other familiar interfaces in favor of the conformity offered by the Info Center? I suspect not, especially since they will have to sacrifice features to do so. For instance, cc:Mail supports blind carbon copies and bulletin boards. Info Center doesn't.

## Networking by Phone

Okay, so I've checked voice mail, logged remotely into E-mail, and fired up my trusty old word processor. Suddenly I realize I've left that one critical file back at the office. And did I mention, it's 11 p.m.?

In the old days, if I'd been clever enough to have remote access package like Close-Up or PC Anywhere installed on both my laptop and main machine, I'd be in business. If not, I'd have had two options: recreate the file from scratch, or turn off my mobile PC and turn on Letterman. Ah, but these are modern times, and I'm packing a beta copy of Windows 95, which comes with its own remote access application. I can dial into the PC back at my office and grab what I need.

With my beta software, though, remote access initially proved a bit dicey. The trick, I discovered, is to make sure network drivers are installed on both machines—sort of confusing since the office machine I'm dialing into is a stand-alone PC and not on a network. But after I cleared that conceptual hurdle, the New Connections Wizard pretty much did the rest, stepping me through the hookup process and allowing me to pick up the file remotely. Of course, the dialing profiles I had created in Dial Helper came in handy here, except for one small problem: I forgot to leave my office PC turned on. Hmmm, maybe it *is* Letterman time after all. —Steve Fox

## About Time...

**DOS Tool Bar.** For those of us raised on Windows, the more graphical the better. Hover help provides guides for people reluctant to use DOS.

## Top 10 Ways to Crash a Beta

So much for Stupid Pet Tricks. I've got an even better way to push an operating system to its limits. I'll play a few games. Sure, it's a fun job, but someone has to do it. The first hurdle is to install the hardware necessary to take advantage of multimedia. To wit: a CD-ROM drive and a sound card.

Grabbing a fistful of CD-ROM games, I made for the PC World Test Center. There, I loaded Windows 95 on a Pentium-60 Empac Magnum PC and rounded up a Sony CD-ROM drive, an Adaptec SCSI card, and a Sound Blaster 16 sound card. Using Windows 95 to install a new device is just a matter of clicking through a series of pop-up menus and occasionally inserting a disk. In short order, Windows 95's system resources recognized the CD-ROM drive and the sound card. But there was a problem. The sound card wouldn't work. Repeated efforts to reinstall the driver or change the configuration failed.

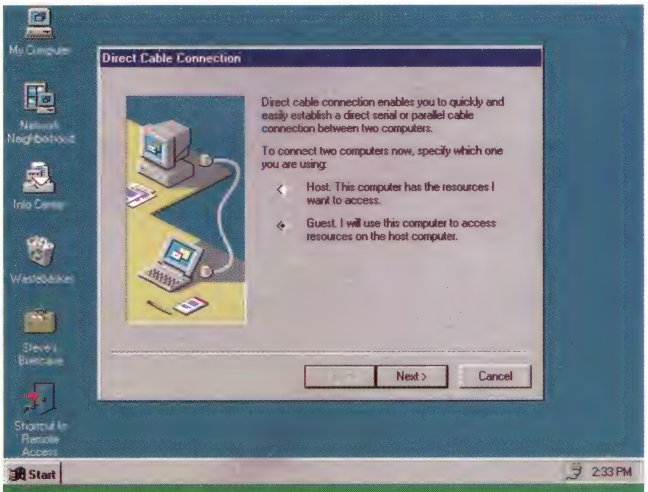
Susan Silvius, one of the hot-shot analysts in the Test Center, offered a solution: Try a multimedia PC that is already working with Windows 3.11. I was eager to play the stack of CD-ROMs as she led me to an Ares DX4-100 with a Future Domain SCSI card, Plextor quad-speed CD-ROM drive, and a Sound Blaster 16 card. It took a while to load Windows 95's 14 disks, but I knew the games would be worth the wait.

Sure enough, Windows 95's system resources found the SCSI and sound cards. Trouble was, neither the CD-ROM drive nor the sound card were working. Again and again the beta struggled unsuccessfully to configure my Sound Blaster 16 card and Future Domain SCSI controller. Oh well, it's only beta. And it is Windows. So far, I've had a typical multimedia PC experience: about four hours of white-knuckle "fun."

## Today's Sights and Sounds

Still, if promises become products, the principal multimedia benefit of Windows 95 will probably be Plug and Play. This industry spec is designed to instantly recognize the addition and removal of peripherals and components such as SCSI and sound cards. Theoretically, with Plug and Play Windows 95 will identify conflicts caused by today's products, which Microsoft calls "legacy hardware," so you can change settings in software. When Plug and Play PCs and boards arrive in the second half of 1995, the configuration of those next-generation components is supposed to be instant, automatic, and hassle-free. My experience indicates Microsoft and others still have a lot of work to do before configuration is that easy.

So, if I had been able to get my sound card and CD-ROM up and running, what other advantages should Windows 95 have offered me, a multimedia user?



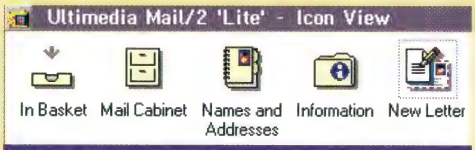

HOOKED UP: Direct Cable Connection lets you link two PCs with just a cable—and no network cards.

# Push-Button Internet?

NO SWEAT: The new OS/2 should ease configuration pains.

Getting onto the Internet has historically been a painful, time-consuming exercise, accompanied by much gnashing of teeth. Now, to the aid of the average user come IBM and Microsoft. Warp (the code name for the next version of OS/2) and Windows 95 are both expected to include the basic communications protocols required for net surfing, greatly simplifying the process of hooking up to the Internet.

The key to the Internet's treasures is the Transmission Control Protocol/Internet Protocol (TCP/IP), and it will ship with both Warp and Windows 95. Including this protocol will make connecting to the net possible, but wouldn't it be nice if you could just click on a button that says "Internet"? Judging from beta versions of Warp and Windows 95 I've looked at, push-button access isn't here yet, but it's getting a little closer.

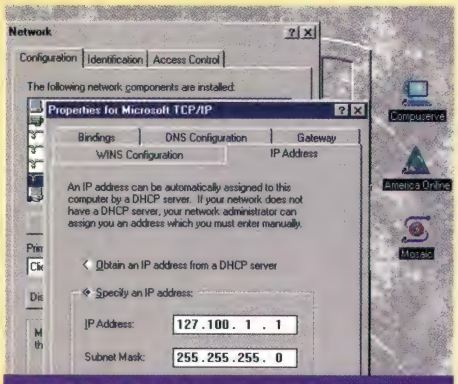



NO FUSS: OS/2's Ultimedia Mail/2 E-mail tool supports drag-and-drop multimedia file attachments.

IBM has always had close ties to the defense industry and higher education, where the Internet originated, which may explain why it plays this game better than Microsoft. Warp will include a full suite of Internet protocols and utilities, redesigned to offer no-pain configuration, while Windows 95 will initially offer only the barest level of TCP/IP connectivity.

To connect to the net using Warp, you select the Internet as your destination, enter some minimal configuration information as supplied by your online service provider, dial in, and make the connection. And if you don't already have a local or national Internet service provider, you can connect through IBM's Advantis network. Not too hard.

Microsoft takes a different tack: It offers TCP/IP as simply another network protocol you choose from the Network option in Control Panel. It took several calls to Microsoft's TCP/IP team to get the right combination of network configurations and TCP/IP addressing. Even when they thought everything was configured just so, I couldn't connect to a local Internet service provider because Microsoft had implemented the protocols in a nonstandard fashion. Microsoft now has an emergency response team working on the situation.




NO FRILLS: Windows 95 will provide a bare-bones collection of tools for surfing the net.

However you make the connection, you won't be able to do anything without a suite of TCP/IP utilities: You'll need, at minimum, a mail tool to read and send E-mail, an Archie tool to locate downloadable files, an FTP tool to transfer those files, a telnet tool to log into remote computers, and a news reader to browse messages from Usenet discussion groups. You may also want an IRC client to participate in the live Internet Relay Chat network, a WAIS tool to perform full-text searches of document libraries, a Gopher client that will allow you to graphically browse document collections, a Veronica tool to browse document titles in gopherspace, and Cello or Mosaic—multimedia front ends to the rapidly growing portion of the Internet known as the World Wide Web.

Again, IBM bests Microsoft. Warp will ship with a sophisticated collection of visually appealing tools for gophering, FTP, telnet, news, and 3270 terminal emulation. An OS/2 implementation of Mosaic is scheduled for release sometime in the first quarter of 1995. Windows 95 will ship with text-based FTP and telnet clients only.

The good news is, you don't have to rely on Microsoft or IBM for a full complement of surfer's tools. Once you have the Internet connection up and running, you can use the basic utilities that come with Windows 95 or Warp to cruise the net for freeware and shareware versions of such advanced goodies as Mosaic. You can also choose from a number of forthcoming commercial packages, including the outstanding Eudora E-mail tool, that will install over TCP/IP.

To try Microsoft's TCP/IP, as currently implemented in Windows for Workgroups 3.11, dial the Microsoft Download BBS at 206/936-6735 or access it via the Internet using FTP at the address ftp.microsoft.com. The commercial version of OS/2 should be available by the time you read this.

—Joe Abernathy

Number 1: Better performance. Microsoft claims that Windows 95 will improve video and audio performance dramatically; its 32-bit CD-ROM file system, CDFS, replaces MSCDEX (Microsoft's CD-ROM driver) and provides a faster data stream from CD-ROM to display. The result should be sound that remains synchronized and smoother video with fewer dropped frames.

You'll also be able to move video windows without interrupting the video, thanks to Windows 95's multitasking talents and its ability to let multiple 32-bit processes share the CPU. That's the claim, and it worked well in the demo Microsoft gave. We'll see.

Number 2: Staying in step. As many users found when they tried to play Myst, drivers change. Frequently. If you don't cruise the bulletin boards, you're probably using out-of-date video and sound drivers. Windows 95 will provide you with the latest set of drivers—at least for a few minutes.

CD-ROM drives aren't just for games and databases. They also play audio CDs.

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**D***
- 128MB RAM
- 9GB SCSI-2 HD
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- 8MB RAM, 256K write-back cache
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- 2X CD-ROM drive, 3.5" floppy drive
- SoundBlaster16, joystick & speakers
- 14.4/ Fax/ Modem & WinFax Lite
- PCI 64-bit graphics accelerator (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia CD
- Microsoft Encarta® CD
- Quicken® CD Deluxe Edition
- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault Indiana Jones & Day of the Tentacle

**$2,499**

## 486 HOME MPC

- 2X CD-ROM drive, 3.5" floppy drive
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- 14" Micron 14FG, 1024NI, .28mm
- Low profile desktop case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS Works Multimedia CD, Encarta CD
- Quicken CD Deluxe Edition
- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault, Indiana Jones & Day of the Tentacle

- 486SX 33MHz
- 4MB RAM
- 210MB IDE HD

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- 486DX2 66MHz
- 8MB RAM
- 420MB IDE HD

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## 433 MAGNUM LP

- Intel 486SX 33MHz processor
- Pentium Technology Ready (ZIF)
- 4MB RAM (expandable to 48MB)
- 210MB 14ms IDE hard drive
- Local bus graphics (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- Low profile desktop case
- 5 16-bit ISA slots
- MS-DOS & Windows for Workgroups
- Microsoft Mouse, 101-key keyboard
- Microsoft Works for Windows

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intel inside

## 466 PCI MAGNUM

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM, 256K write back cache
- 420MB 14ms IDE hard drive (PCI)
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- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
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- Pentium Technology Ready (ZIF)
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- Intel 60MHz Pentium processor
- 8MB RAM, 256K write back cache
- 420MB 14ms IDE hard drive (PCI)
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia CD

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Circle 217 on reader service card

Microsoft is including CD player software with controls modeled after home electronic CD players.

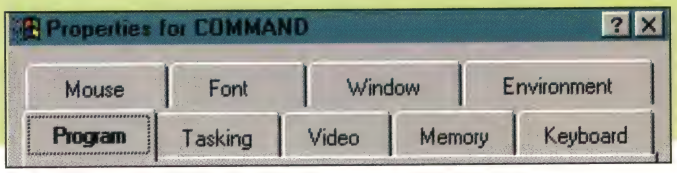
Number 3: Future apps. Windows 95 will include extensions to the Windows 3.11 Graphics Device Interface drivers, which are used to draw circles, move text, and place fonts. The display driver extensions, called the Display Control Interface, will govern the processing of video images and provide for smooth full-screen playback with richer colors, at least if developers support it in their applications and add-in cards.

Running and installing CD-ROM software will also be easier once developers take advantage of the new AutoPlay feature by including an AUTORUN.INF file on their disks. Pop the disk into your player and the file tells Windows to load the software if it's the first time you've used the disk, or to run the program if it's already been installed.

Finally, polymessage technology will let applications play sound files as the driver searches for data or video files. This should put an end to annoying blank pauses that plague multimedia programs, which prompt users to prematurely present the three-fingered salute .

## About Time...

**DOS Properties.** Good-bye, PIF. Set the amount of expanded memory, choose a full screen or a window, and change the icon for a DOS app—all from one place.

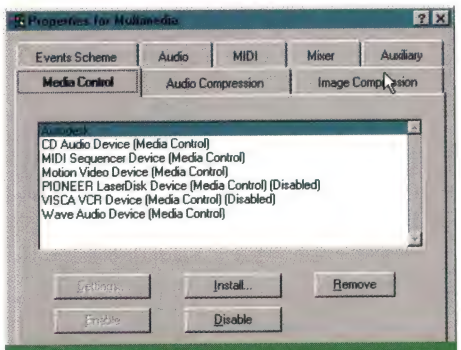



## DOS Is as DOS Does

Many multimedia applications are games, and most are DOS-based. If you've ever struggled to free up 595K of conventional memory, as I have on many occasions, you know how much fun they are to prepare for play. Thankfully, Windows 95 relieves that memory crunch.

The Windows 95 beta let me play some of the more conventional memory–intensive floppy-based DOS games that used to throttle my Everex 486, a 33-MHz system with 8MB of RAM. Windows 95 uses new 32-bit virtual device drivers that replace the 16-bit real-mode drivers in Windows 3.11. The older drivers made it hard to free up memory and to run DOS games while Windows was running. To conserve conventional memory, Microsoft loads only space-saving pointers to the actual drivers, which now reside in high memory. Drivers for NetWare client software, CD-ROM, mouse, and SCSI are among those Microsoft has virtualized to save on conventional memory. A virtual device driver for the system timer now enables you to run DOS-based programs within Windows.

In the past, even with memory freed up, I had to tweak my system to run any multimedia apps—DOS or Windows—which entailed frequent trips to the DOS editor to tinker with AUTOEXEC.BAT and CONFIG.SYS. Well, in Windows 95 I don't need to bother with those two trolls anymore. They exist for compatibility reasons and are processed during startup, but Windows no longer needs them.




ONE-STOP MULTIMEDIA: Now there's a command center for all audio and video functions.

Also gone is the Program Information File, replaced by the ubiquitous Properties option that pops up whenever you right-click a file name or icon. Select Properties for a DOS-based executable file, and you're presented with a 10-tab pop-up of options that let you set everything from the amount of memory the application may request to whether the application should run full-screen or in a window. Microsoft's goal is to enable every DOS application to run within Windows, but if that doesn't work, you will be able to run a DOS application in real mode by selecting MS-DOS Mode. Microsoft claims that most DOS applications will be able to run in a sizable window and that this will be the default setting. But the limited number I tried—Id Software's Wolfenstein 3-D, Lotus's 1-2-3 release 4.0, SSI's Clash of Steel, and Norton-Lambert's Close-Up 6.0—all required a full screen. Only DOS itself would run in a window.

DOS applications should cause fewer crashes in Windows 95 than in Windows 3.1. While Windows 3.1 lets you open more than one DOS application, Windows 95 should let you open and *run* any number of them at once—including those that would force you to exit Windows 3.1, as most games do. This effectively provides preemptive multitasking for DOS applications, and because of the way Windows 95 is constructed, is supposed to prevent a frozen DOS application from bringing the entire system to a halt.

Unfortunately, that was not my experience. I found that Wolfenstein frequently corrupted the video in Windows, while Close-Up 6.0 and Clash of Steel caused my system to freeze, requiring a reset. Ah, the joys of beta software. —Russell Glitman

## Better Beta Before Product

Given all the unresolved problems and unfinished features we encountered in beta, we're keeping our fingers crossed. According to Microsoft, at least two more rounds of beta are expected later this year and early 1995. As soon as we get a copy that will stand up to it, we'll run tests to gauge system responsiveness, RAM requirements, software compatibility, and performance criteria that will ultimately determine whether Windows 95 is an essential upgrade or merely a promising collection of features.

In the meantime, we gaze into our crystal balls, trying to figure whether Microsoft's "first half of 1995" means January or June. If you have an office pool on this sort of thing, smart money suggests later is better.

*Joe Abernathy is senior news editor, Steve Fox senior features editor, and Russell Glitman executive editor for* PC World.

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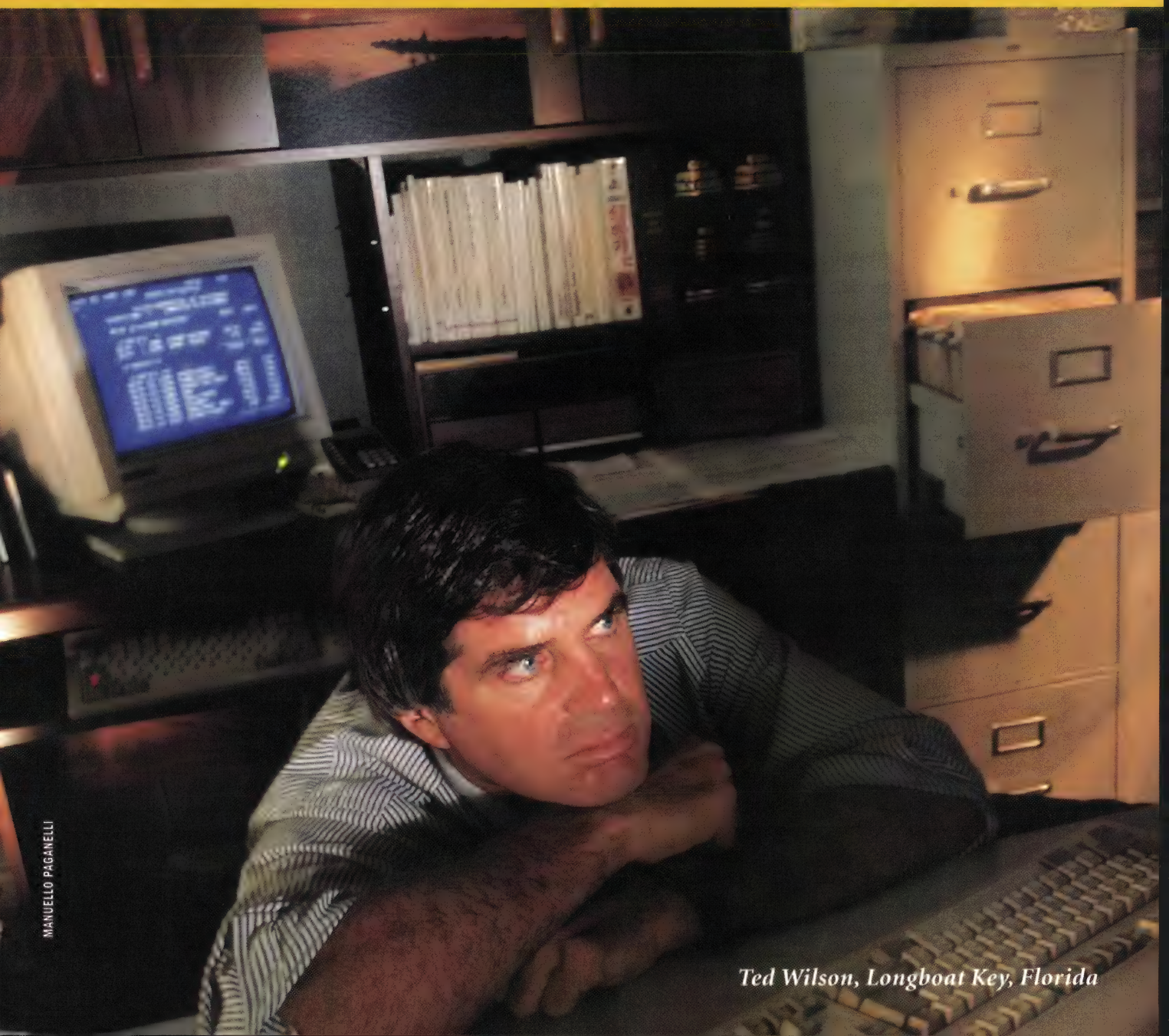
# For Better

## 96,000 readers rate their PCs and the companies that make them.



MANUELLO PAGANELLI

*Ted Wilson, Longboat Key, Florida*

# or Worse

When you buy a new computer, you're getting more than the latest PC wizardry. You're getting the expertise and service of the company that makes it. But how do you tell the difference between a great deal on a new PC and a bargain that's best avoided, no matter how tempting the system's price may be?

It's not easy.

Just ask Ted Wilson, president of Accounting/Computers/Taxes in Longboat Key, Florida. He thought he'd found a winner when he ordered an Ambra 486 with IBM's Blue Lightning chip last December. "It had a competitive price, came with on-site support, and was backed by the IBM name. I figured I couldn't go wrong," says Wilson.

But he figured wrong. It took nearly two months for Wilson to get his computer, and when it did arrive he couldn't get it to run with both the network card installed and his CD-ROM drive enabled. And lest you think that the CD-ROM drive was just for fun and games, all of his tax research materials were located on CD-ROM.

"It cost me dearly in time during tax season," says Wilson. "Thanks to Ambra I wound up working 16-hour days."

Last June we published our first report on reliability and service ("Your New PC: DOA or Destined for Glory?"). Based on 45,000 responses to our monthly fax-back questionnaire, the report provided reliability and service assessments on 21 of the largest PC manufacturers in the United States—a snapshot of the entire industry.

For this update, we've widened our lens to include responses from 96,195 PC buyers—the largest number ever used for evaluating desktop computer reliability and service. Thanks to the deluge of faxes, we have enough data to provide detailed reports on 42 companies, representing 70 percent of all computers sold in this country.

### The Best of Both Worlds

Ask PC buyers what they want from a new computer, and they consistently say solid reliability and good service. But judging from the responses that we've received, few consumers experience the best of both worlds. For starters, nearly 44 percent of all respondents reported at least one problem with their computer, with 6.7 percent saying one or more components didn't work when they opened the box. Readers reporting prob-

**By Roberta Furger and Daniel Tynan**

# Winners and Losers

When it comes to providing that winning combination of excellent reliability backed by top-notch service, Compaq can't be beat. The Houston, Texas, company is the only PC maker that earns our top rating in both categories. For detailed assessments of each company's record in nine key areas, see "Best and Worst: Reliability and Service" on pages 154 and 155.

Source: PC World Reliability and Service Monitor, October 1993 through July 1994. Desktop PCs only. Rankings reflect the opinions of questionnaire respondents only and are not projectable to a broader population. Reliability rankings are based on a company's scores in the following areas: the percent of respondents who had a problem, the percent who found any component "dead on arrival," and the percent reporting no problem ever. Service rankings are based on scores in the following areas: the percent rating service below average, the percent rating service better than average, how long it took respondents to reach a person who could help them, the average time it took to resolve the problem being reported, the percent saying their problem was never resolved, and the percent who would buy the same brand again. Overall rankings are based on the sum of the total scores for service and reliability. Companies are listed alphabetically within groupings. See page 158 for a full explanation of the methodology.

## OVERALL

**BEST**

- Apple
- AT&T (NCR)
- Compaq
- Dell
- IBM

**ABOVE AVERAGE**

- ALR
- AST Research
- CompuAdd
- DEC
- DTK
- Epson
- Hewlett-Packard
- Hyundai
- Micron
- NEC Technologies
- Pionex
- Swan
- Unisys

**AVERAGE**

- Acer America
- Acma
- Austin
- Compudyne
- Everex Systems
- Gateway 2000
- Tri-Star
- Wyse
- Zeos International

**BELOW AVERAGE**

- Ares Microcomputer
- Blackship
- Leading Edge
- Micro Express
- Packard Bell
- Samsung
- Tandy
- USA Flex
- Vtech
- Wang
- Zenith Data Systems

**WORST**

- Ambra
- Comtrade
- Cornell
- Insight

## RELIABILITY

**BEST**

- Apple (715 respondents)
- AT&T (NCR) (540)
- Compaq (4410)
- Hewlett-Packard (833)
- IBM (8308)

**ABOVE AVERAGE**

- Acer (1089)
- Acma (185)
- ALR (570)
- AST Research (2391)
- DEC (620)
- Epson (613)
- Everex (682)
- NEC (1060)
- Unisys (227)

**AVERAGE**

- Ares (147)
- CompuAdd (1198)
- Dell (4160)
- DTK (1424)
- Hyundai (421)
- Leading Edge (1297)
- Packard Bell (6180)
- Pionex (397)
- Samsung (239)
- Swan (307)
- Tandy (1558)
- Vtech (414)
- Wyse (166)
- Zenith (703)

**BELOW AVERAGE**

- Austin (304)
- Blackship (158)
- Compudyne (1152)
- Gateway (14,422)
- Micron (614)
- USA Flex (217)
- Wang (170)
- Zeos (2802)

**WORST**

- Ambra (205)
- Comtrade (291)
- Cornell (172)
- Insight (581)
- Micro Express (357)
- Tri-Star (287)

## SERVICE

**BEST**

- Compaq (698 respondents)
- Dell (1045)
- Micron (176)
- Swan (85)
- Tri-Star (101)

**ABOVE AVERAGE**

- ALR (138)
- Apple (97)
- AST Research (493)
- AT&T (NCR) (92)
- Austin (87)
- CompuAdd (305)
- Compudyne (330)
- DEC (115)
- DTK (327)
- Gateway (4003)
- IBM (1468)
- Pionex (116)
- Unisys (38)
- USA Flex (64)
- Zeos (795)

**AVERAGE**

- Epson (132)
- Hewlett-Packard (147)
- Hyundai (99)
- Micro Express (117)
- NEC (209)
- Wang (44)

**BELOW AVERAGE**

- Acer (233)
- Acma (44)
- Ambra (79)
- Ares (37)
- Blackship (43)
- Everex (139)
- Insight (192)
- Leading Edge (329)
- Samsung (62)
- Wyse (40)
- Zenith (153)

**WORST**

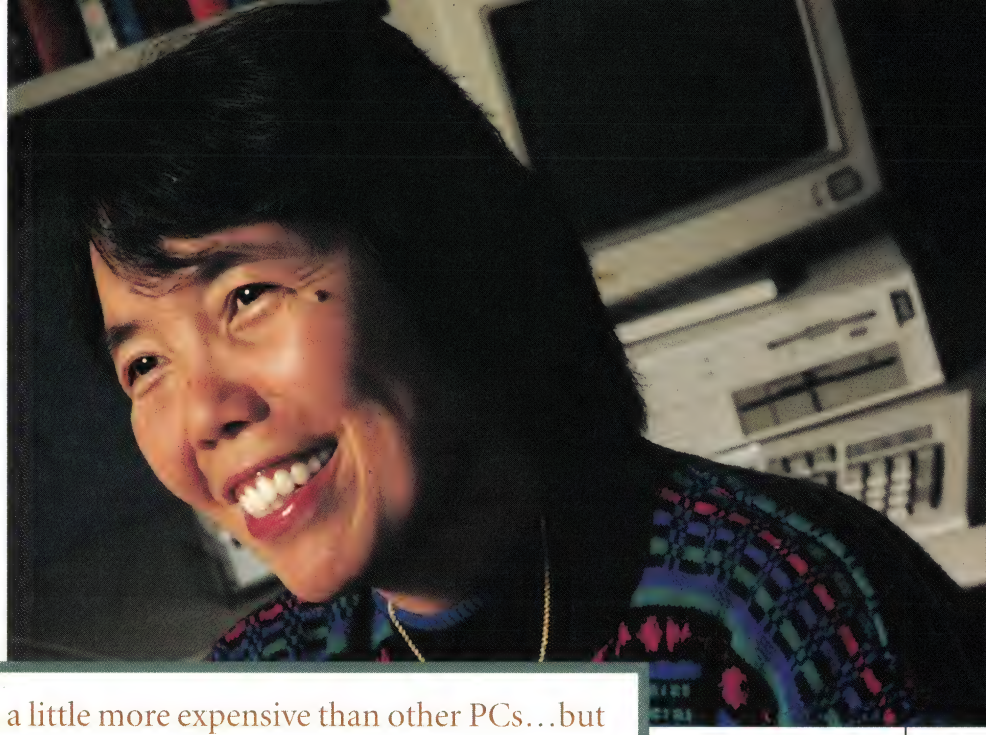
- Comtrade (120)
- Cornell (71)
- Packard Bell (1697)
- Tandy (385)
- Vtech (110)

JONAS HOGLUND

lems averaged nearly two problems per PC, ranging from simple driver conflicts that could be resolved by a phone call to the PC manufacturer, to failed components such as hard drives, monitors, and motherboards that had to be replaced.

There's plenty of room for improvement on the service front, too. On average, it took respondents 1½ days to reach someone at their PC company who could help them, and nearly 10 days to actually get the problem fixed. Only half our respondents rated the service that they received as very good or as excellent.

Just one company managed to make it into the top tier for both reliability and service: Compaq of Houston, Texas. Compaq stumbled earlier this year when its technical support lines were flooded with calls from Presario owners (the company's low-cost line for small-business and home users). But by beefing up its technical support department and instituting new online forums, Compaq managed to correct its problems before suffering a drop in sales. In fact, Compaq sold more computers in the first quarter of this year than did any other PC maker—for the first time beating out both Apple and IBM.



"It was a little more expensive than other PCs...but I've never had a problem with my Compaq."
*—Betty C. Jung, Hartford, Connecticut*

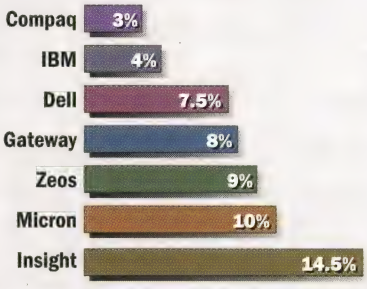
Betty C. Jung, an epidemiologist for the state of Connecticut, counts herself among the many lucky—and perfectly satisfied—Compaq owners. For the last year and a half, Jung has used a Compaq ProLinea to maintain several large databases. Because her job involves tracking the health of thousands of people, reliability is indispensable. "If I didn't have my computer up and running, I couldn't do my job," says Jung. "Compaq is a little more expensive than other computers...but I've never had a problem." The only upkeep required so far has been a simple RAM upgrade.

Unfortunately, we didn't find the same level of satisfaction in the hundreds of Comtrade and Cornell customers who responded to our questionnaire. These two low-cost assemblers had the most unreliable PCs of any of the companies in our poll and were the worst when it came to service—a combination buyers should avoid, no matter how low the price.

"The price of the system was excellent," says Jeffrey Weiner, a bookstore manager in Lincoln Park, New Jersey, of his Comtrade 486. But after waiting 2½ months for his purchase to arrive, Weiner discovered that his new PC would not even boot up—and Comtrade technical support was AWOL when he called for help. "I suppose I'm the victim of the old axiom 'You get what you pay for,'" he adds, noting that he wishes he'd taken a friend's advice and bought from a firm he knew more about.

## Don't Blame It on the Shippers

A PC shipped through the mail doesn't have to wind up DOA on your doorstep. Compaq and IBM post low DOA numbers—no matter how the PC is sold. Compare their DOA rates on mail-order PCs to those of other direct marketers. The results are telling.




Source: PC World Reliability and Service Monitor, October 1993 through July 1994. Desktop PCs only. Percentage of respondents buying by phone or mail who reported one or more PC components DOA. Results not projectable to broader population.

**Single-Subject Stars**

Though few companies manage to excel in both reliability and service, many succeed in one of these important areas. The top tier of our reliability ranking reads like a who's who of the computer industry: Apple, AT&T (NCR), Compaq, Hewlett-Packard, and IBM. Among our respondents, these industry leaders boast some of the lowest incidence of dead-on-arrival (DOA) systems or components, coupled with the highest number of users who've never encountered a problem. At the bottom of the reliability list are companies whose lower prices seem to leave little room for quality assurance testing: Ambra (scheduled to shut down operations this month), Comtrade, Cornell, Insight, Micro Express, and Tri-Star. Respondents reported up to 2.4 times as many problems with their purchases from these bottom-tier companies—and 2.5 to 5 times as many DOA components as were reported for the top-rated PC makers.

In our last report—and in this update—DOA rates for mail-order companies were considerably higher than for companies that traditionally sell through retail stores or through a field sales force. Do companies such as AT&T, Compaq, Hewlett-Packard, and IBM have a built-in advantage, since a dealer or MIS person might fix problems before products ever reach a user's desk? Not according to our data. Regardless of how the computers were sold, our readers reported far lower DOA rates for top manu-

MELANIE EVE BAROCAS

# Best and Worst: Reliability and Service

**Readers rate 42 PC companies in nine key categories.**

**PROBLEM RATE:** The percent of respondents reporting one or more hardware problems over the life of their system. (25 percent of overall ranking.)

**DOA RATE:** The percent of respondents who reported one or more components dead on arrival. (17.5 percent.)

**NO PROBLEMS EVER:** The percent of respondents reporting they've never had a problem. (7.5 percent.)

**LOW SATISFACTION:** The percent of respondents reporting below average satisfaction with service. (5 percent.)

**HIGH SATISFACTION:** The percent of respondents obtaining service who reported better than average satisfaction. (5 percent.)

**TIME TO TALK:** How long it took respondents who obtained service to reach a support staffer who could help with the problem. (5 percent.)

**TIME TO RESOLVE:** How long it took to fix respondents' problems. (10 percent.)

**UNRESOLVED PROBLEMS:** The percent of respondents reporting problems and obtaining service who said their problems were never resolved. (15 percent.)

**BUY AGAIN BASED ON SERVICE AND SUPPORT:** The percent of respondents reporting on service who would buy from the company again based on the service they received. (10 percent.)

| ★★★★★ BEST | | DOA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Apple** Nearly trouble-free machines—fortunate, since the company isn't speedy with repairs. | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★ | ★★★★ | ★★★★ |
| **AT&T (NCR)** Superb reliability, more than satisfactory service. | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★ | ★★★★ | ★★★ | ★★★★ | ★★★ |
| **Compaq** A winning combination: excellent reliability and superior service. | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★★ |
| **Dell** If something goes wrong, you're in good hands with this service star. | ★★★ | ★★★ | ★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ |
| **IBM** Few problems and rapid repairs—a fine combination. | ★★★★ | ★★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★★ | ★★★★ |

| ★★★★ ABOVE AVERAGE | | DOA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **ALR** A contender; doesn't drop below average in any category. | ★★★ | ★★★★ | ★★★ | ★★★★ | ★★★ | ★★★★ | ★★★ | ★★★★ | ★★★★ |
| **AST Research** Slow service, but the PCs are so well constructed you may never have to find out. | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★ | ★★ | ★★ | ★★★★ | ★★★★ |
| **CompuAdd** High problem rate is *almost* balanced out by swift response. | ★★ | ★★★ | ★★ | ★★★ | ★★★ | ★★★★ | ★★★★ | ★★★ | ★★★ |
| **DEC** Well-made machines, with service to match. | ★★★★ | ★★★ | ★★★★ | ★★★★ | ★★★ | ★★★★ | ★★★★ | ★★★ | ★★★★ |
| **DTK** Fast talkers and good problem solvers. | ★★★ | ★★★★ | ★★★ | ★★★ | ★★★ | ★★★★ | ★★★★ | ★★★ | ★★★ |
| **Epson** Reliable machines and solid support. Still, customers are hungry for more. | ★★★★ | ★★★★★ | ★★★★ | ★★★ | ★★ | ★★★★ | ★★★ | ★★★★ | ★★ |
| **Hewlett-Packard** One of the best at building reliable PCs; just be prepared to wait for service. | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★ | ★★ | ★★ | ★★★ | ★★★ | ★★★ |
| **Hyundai** Speedy at repairs, but some customers fall through the cracks. | ★★★ | ★★★★ | ★★★ | ★★★★ | ★★ | ★★★★★ | ★★★★★ | ★★ | ★★★ |
| **Micron** You couldn't ask for better service; too bad you can't say the same about reliability. | ★★ | ★★ | ★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ |
| **NEC Technologies** Few problems, although it takes a long time to fix them. | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★ | ★★★★ | ★ | ★★★ | ★★★ |
| **Pionex** A lot of problems, but no one's ever left hanging. | ★★ | ★★★ | ★★★ | ★★★ | ★★★ | ★★★ | ★★★ | ★★★★★ | ★★★★ |
| **Swan** Fixes problems with speed and grace. | ★★ | ★★★★ | ★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★ | ★★★★ |
| **Unisys** Mostly trouble-free PCs and respectable service, but many users wouldn't buy again. | ★★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★★★ | ★★ | ★★★★ | ★★★★★ | ★★ |

## ★★★ AVERAGE

| | | DOA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Acer America** High marks for reliability, low marks for service. | ★★★★ | ★★★★ | ★★★★ | ★★ | ★★ | ★★ | ★★★ | ★★ | ★★ |
| **Acma** Problems are infrequent, but many of them never get resolved. | ★★★★ | ★★★ | ★★★★ | ★★★ | ★★★ | ★★★ | ★★ | ★★ | ★★★ |
| **Austin** Problem rates are woefully high, but company comes quickly to the rescue. | ★ | ★★★ | ★ | ★★★★ | ★★★★ | ★★★ | ★★★★★ | ★★★ | ★★★★ |
| **Compudyne** Quick-fix experts–and you'll need the help, given the high DOA and problem rates. | ★★ | ★★ | ★★ | ★★★★ | ★★★ | ★★★★ | ★★★★★ | ★★★★ | ★★★ |
| **Everex Systems** Few DOAs, but long waits for repairs and low satisfaction scores. | ★★★ | ★★★★★ | ★★★ | ★★ | ★★ | ★★★ | ★★ | ★★★ | ★ |
| **Gateway 2000** Reliability is nothing to brag about, but company scores big in customer loyalty. | ★★ | ★★★ | ★★ | ★★★★ | ★★★ | ★★ | ★★ | ★★★★ | ★★★★★ |
| **Tri-Star** Fast service makes customers forget their (many) troubles. | ★ | ★★★ | ★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★★ | ★★★★ |
| **Wyse** A mixed bag: low DOA rate, average service, abysmal buy-again rate. | ★★★ | ★★★★★ | ★★ | ★★ | ★ | ★★★ | ★★★ | ★★★★ | ★ |
| **Zeos International** Below-average reliability; better service. | ★★ | ★★ | ★★ | ★★★★ | ★★★★ | ★★★ | ★★★ | ★★★★ | ★★★★ |

## ★★ BELOW AVERAGE

| | | DOA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ares Microcomputer** More problems than most, so-so service. One bright spot: quick at repairs. | ★★ | ★★★ | ★★★ | ★★ | ★★★ | ★★ | ★★★★★ | ★ | ★★★ |
| **Blackship** Long delays on repairs, with many problems going unresolved. | ★★★ | ★★ | ★★★ | ★★★ | ★★ | ★★★ | ★ | ★★ | ★★★ |
| **Leading Edge** Average reliability; however, long waits for repairs put customers on edge. | ★★★ | ★★★ | ★★★ | ★★ | ★★ | ★★ | ★ | ★★★ | ★★ |
| **Micro Express** High problem and DOA rates, and slow to correct problems. | ★ | ★★ | ★ | ★★★ | ★★★ | ★★★★ | ★ | ★★★ | ★★★ |
| **Packard Bell** Average problem and DOA rates, with no visible means of support. | ★★★ | ★★★ | ★★★ | ★ | ★ | ★ | ★ | ★★ | ★ |
| **Samsung** Lots of problems, and many never get taken care of. | ★★ | ★★★★ | ★★ | ★★★ | ★★ | ★★★ | ★★ | ★ | ★★★ |
| **Tandy** Slow turnaround and poor problem solving put Tandy in the doghouse. | ★★ | ★★★★ | ★★ | ★ | ★ | ★★★ | ★★ | ★ | ★ |
| **USA Flex** High problem and DOA rates, but things eventually get fixed. | ★★ | ★ | ★★ | ★★★ | ★★★★ | ★★★ | ★ | ★★★★★ | ★★★ |
| **Vtech** So-so reliability, worse service. | ★★ | ★★★ | ★★★ | ★ | ★★ | ★ | ★ | ★★ | ★★ |
| **Wang** High problem rate, unexceptional service. | ★★ | ★★★ | ★★ | ★★★ | ★★★ | ★★ | ★★★ | ★★★ | ★★ |
| **Zenith Data Systems** Respectable reliability, but too many problems left hanging. | ★★★ | ★★★★ | ★★★ | ★★ | ★★ | ★★ | ★★ | ★ | ★★ |

## ★ WORST

| | | DOA | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Ambra** High DOA and problem rates plus mediocre service spell trouble for customers. | ★★ | ★ | ★★ | ★ | ★★ | ★ | ★★★ | ★ | ★★★ |
| **Comtrade** Bottom of the barrel in every category. | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| **Cornell** Neck and neck with Comtrade. | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |
| **Insight** Minimal support, even worse reliability. | ★ | ★ | ★ | ★★ | ★★ | ★★ | ★ | ★★★ | ★★★ |

Source: Based on October 1993 through July 1994 PC World Reliability and Service Monitor. Desktop computers only. Companies are listed in alphabetical order within categories. Evaluations reflect the ratings of questionnaire respondents only and are not projectable to broader population.

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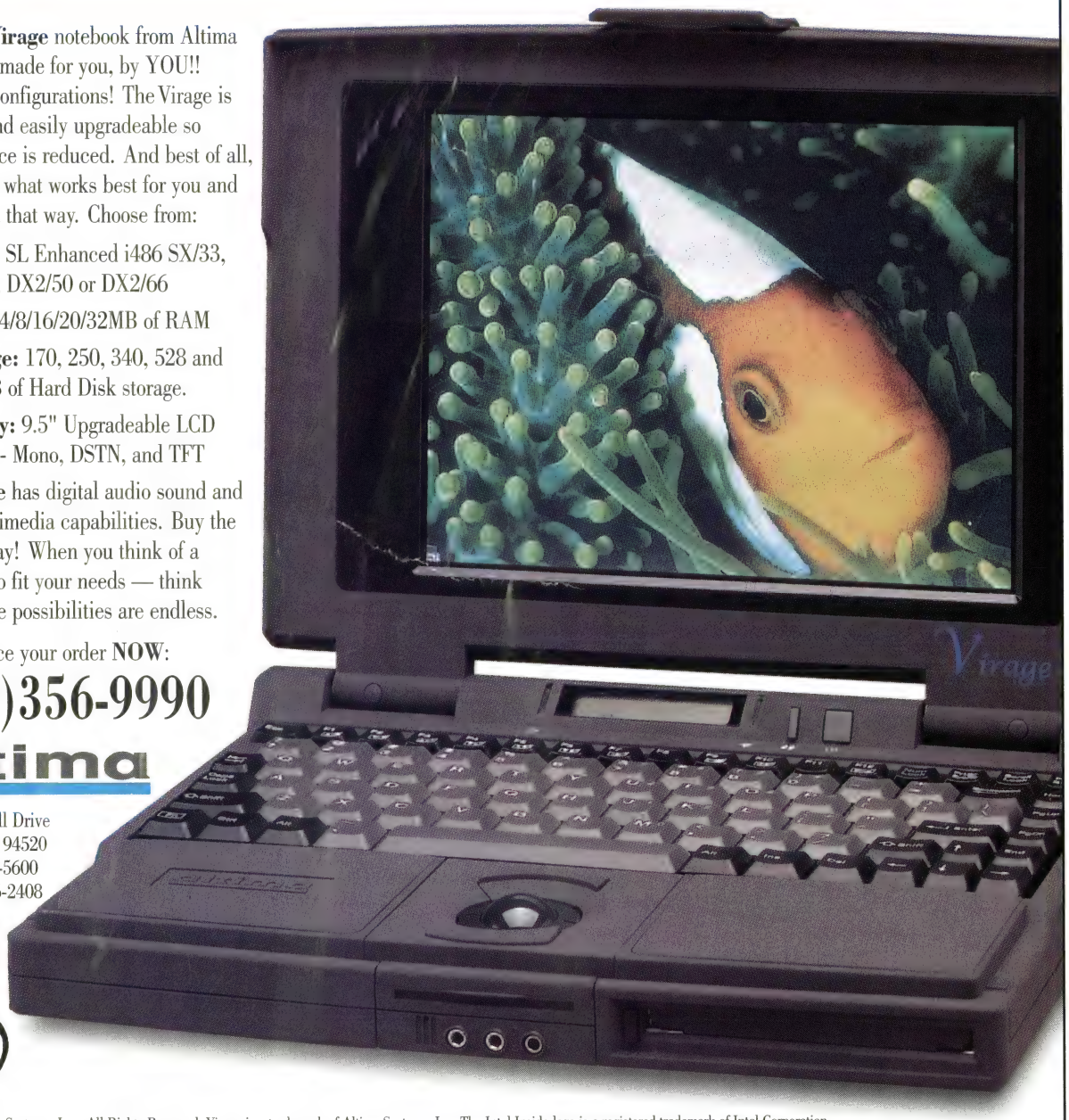


intel inside

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**Circle 27 on reader service card**

facturers than the rates that were posted by the bottom-tier vendors.

But even the best PCs occasionally break down. That's why we asked readers to rate their PC manufacturer's service and support, as well as the machine's reliability. No company got better marks for service than Micron, based in Nampa, Idaho, whose customers reported that they spent the least amount of time waiting for a callback—about half a day on average. "They're fabulous," says Douglas Tyler, a postal worker in South Berwick, Maine. "Knowledgeable, courteous, friendly. It's unbelievable. The next computer I buy will definitely be another Micron."

BRIAN SMALE

### Are You Satisfied?

The bottom line for any company is customer satisfaction. To measure this, we asked our readers a simple question: Based on the service you received, would you purchase another PC from the same company? Overall, nearly 65 percent of those who answered this question said they would.

> "Comtrade's price was excellent. I guess I'm the victim of the old axiom 'You get what you pay for.'"
> —*Jeffrey Weiner, Lincoln Park, New Jersey*

Here, too, readers gave Micron the biggest thumbs-up. An awe-inspiring 88 percent said they'd buy another computer from the manufacturer. Dell, Compaq, and Gateway followed Micron closely in the rankings.

Ironically, two giants in the burgeoning consumer market—Packard Bell and Tandy—have some of the most dissatisfied customers of all. Consider these gruesome statistics: On average, our readers found it took more than 2½ days to even *talk* to someone at Packard Bell who could help them with a hardware problem. Tandy was a full day quicker on the phones, but respondents reported nearly one out of every four problems never got resolved. Not surprisingly, fewer than half the Tandy and Packard Bell customers who returned the questionnaires said they would buy from the same company again based on the service they received.

But companies don't have to post impressive reliability and service scores to keep

## A Word About the Numbers

The Reliability and Service Monitor is a monthly fax questionnaire bound into every issue of *PC World*. The rankings and scores presented in this article were generated by carefully analyzing the results of approximately 96,195 questionnaires returned to *PC World* between October 1993 and July 1994.

Because the Reliability and Service Monitor is not a random-sample survey, its results are not statistically projectable to either the larger base of *PC World* readers or PC owners in general, and the results contained in this article are valid only as statements of the personal experiences of those readers who returned a survey. However, because the Reliability and Service Monitor is not inherently biased toward any particular brand, it does provide valuable insight into relative differences among the companies profiled here.

To minimize the potential for reporting bias (such as receiving completed questionnaires only from owners who had a problem), we offer a monthly prize, which all respondents are eligible to win. We also encourage respondents to return the questionnaire even if their computer has been trouble free; roughly 53 percent of responses did *not* report a hardware problem. In addition, we sent an identical questionnaire to a randomly selected group of 4000 subscribers and determined that, in the aggregate, measures of reliability and service (such as average incidence of component failure) in the random-sample survey were comparable to those generated by our fax questionnaire.

We limit our reporting to companies about whom we have received at least 125 usable responses. This base reporting requirement minimizes the probability that a small number of disgruntled or ecstatic owners will disproportionately affect a company's scores. We also note the respondent base for the service and reliability rankings.

To produce a company's reliability score, we tabulated and combined its raw scores in three categories: the percent of respondents with one or more problems (50 percent weighting), the percent who had any component DOA (35 percent), and the percent reporting they'd never had a problem with the computer (15 percent).

To produce a company's service score, we tabulated and combined its raw scores in six categories: the percent of respondents reporting below average satisfaction with service (10 percent weighting), the percent of respondents who reported better than average satisfaction (10 percent), the average time it took respondents to reach a support staffer who could help with the problem (10 percent), the average time it took to fix respondents' problems (20 percent), the percent of respondents who said their problems were never resolved (30 percent), and the percent of

**continues on page 160**

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**continued from page 158**
respondents who would buy the same brand again (20 percent). We counted only respondents who reported a problem and obtained service.

To produce an overall score, we tabulated and combined raw service and reliability scores (50 percent weighting each). Where appropriate, raw scores for all companies were normalized to give them their proper weight in the calculations.

We ranked reliability, service, the combination of the two (overall), and each of the nine categories listed above. To determine the rankings, we divided the companies' raw scores into five groups and assigned a rank from 1 (worst) to 5 (best) to each group. Lists of reliability, service, and overall rankings are sorted alphabetically within each group.

A company's ranking in individual categories, as well as in the reliability, service, and overall lists, may have changed from its ranking in our previous report. This is due to an increase in the number of responses upon which this report is based and to changes in our scoring methodology.

### About the Star System

Stars are awarded based on responses tabulated from customers of individual companies. **Five stars:** best. **Four stars:** above average. **Three stars:** average. **Two stars:** below average. **One star:** worst.

**PROBLEM RATE:** The percent of respondents reporting one or more hardware problems over the life of their system. Five stars: 33 percent or less. Four stars: more than 33 percent, to 40 percent. Three stars: more than 40 percent, to 45 percent. Two stars: more than 45 percent, to 52 percent. One star: more than 52 percent.

**DOA RATE:** The percent of respondents who reported one or more components dead on arrival. Five stars: 4 percent or less. Four stars: more than 4 percent, to 6 percent. Three stars: more than 6 percent, to 8 percent. Two stars: more than 8 percent, to 11 percent. One star: more than 11 percent.

**NO PROBLEMS EVER:** The percent of respondents reporting they've never had a problem. Five stars: 64 percent or more. Four stars: less than 64 percent, to 58 percent. Three stars: less than 58 percent, to 52 percent. Two stars: less than 52 percent, to 47 percent. One star: less than 47 percent.

**LOW SATISFACTION:** The percent of respondents reporting below average satisfaction with service. Five stars: 20 percent or less. Four stars: more than 20 percent, to 27 percent. Three stars: more than 27 percent, to 34 percent. Two stars: more than 34 percent, to 41 percent. One star: more than 41 percent.

**HIGH SATISFACTION:** The percent of respondents obtaining service who reported better than average satisfaction. Five stars: 61 percent or more. Four stars: less than 61 percent, to 52 percent. Three stars: less than 52 percent, to 45 percent. Two stars: less than 45 percent, to 36 percent. One star: less than 36 percent.

**TIME TO TALK:** How long it took respondents who obtained service to reach a support staffer who could help with the problem. Five stars: 24 hours or less. Four stars: more than 24 hours, to 32 hours. Three stars: more than 32 hours, to 40 hours. Two stars: more than 40 hours, to 50 hours. One star: more than 50 hours.

**TIME TO RESOLVE:** How long it took to fix respondents' problems. Five stars: 8 days or less. Four stars: up to 9 days. Three stars: up to 10 days. Two stars: up to 11 days. One star: more than 11 days.

**UNRESOLVED PROBLEMS:** The percent of respondents reporting problems and obtaining service who said their problems were never resolved. Five stars: 9 percent or less. Four stars: more than 9 percent, to 12.5 percent. Three stars: more than 12.5 percent, to 16.5 percent. Two stars: more than 16.5 percent, to 22 percent. One star: more than 22 percent.

**BUY AGAIN BASED ON SERVICE AND SUPPORT:** The percent of respondents reporting on service who would buy from the company again based on the service they received. Five stars: 78 percent or more. Four stars: less than 78 percent, to 69 percent. Three stars: less than 69 percent, to 59 percent. Two stars: less than 59 percent, to 50 percent. One star: less than 50 percent.

their customers happy. Several companies have managed to prosper despite mistakes—their customer service staff is good at making up for them. As a long-term strategy, though, fixing machines after they're on customers' desks is an expensive way for any company to do business.

The closer a defective product gets to the customer, the more it will cost its manufacturer to repair, according to David Garvin, a professor of business administration at the Harvard School of Business in Cambridge, Massachusetts. "The difference [in cost] between finding a problem [when the computer is] at the supplier versus finding one when it's in the customer's hands is a factor of 100,000."

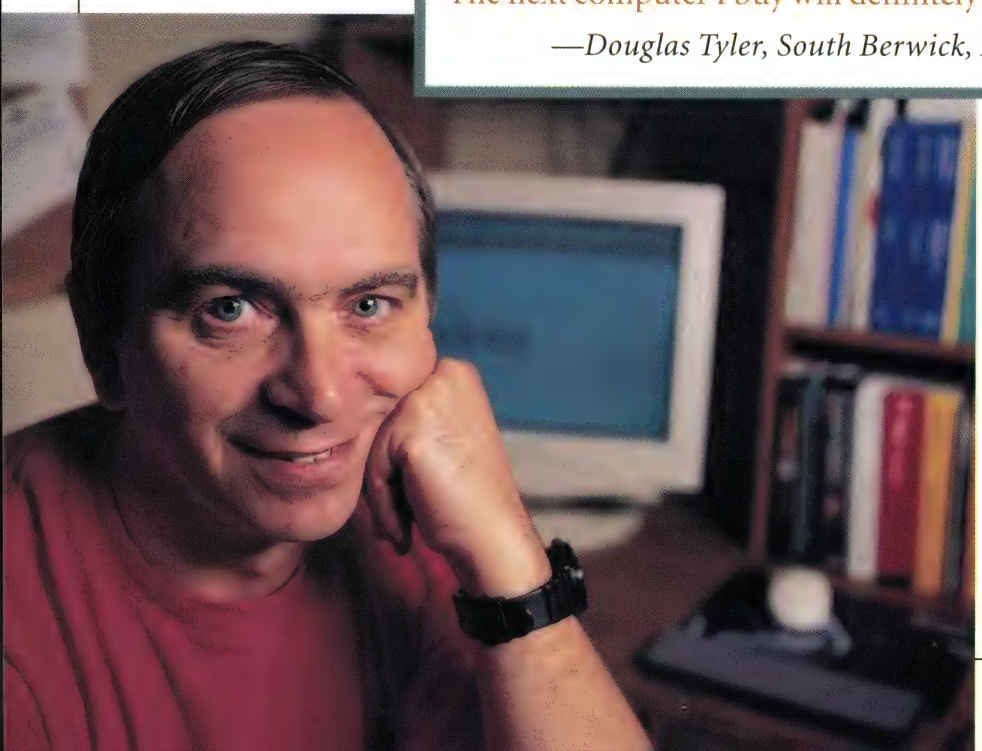
> "They're knowledgeable, courteous, and friendly. The next computer I buy will definitely be a Micron."
> —*Douglas Tyler, South Berwick, Maine*

### Stay Tuned

Change is the one constant in the PC business. Today's price/performance leader may be tomorrow's casualty, dragging all of its unfortunate customers along in its wake. Can Compaq continue to excel in both reliability and service while remaining competitive in price? Will Micron's below average reliability start eating away at its excellent customer service record? Can Packard Bell continue to dominate the consumer market without radically improving its customer service?

Only time—and the growing ranks of PC users—will tell.

*Roberta Furger is a* PC World *senior editor. Daniel Tynan is a contributing editor for* PC World. *Operations analyst Adam Block of Interactive Fax Products,* PC World *research director Cheryl Brink,* PC World *editorial intern Valerie Singer, and freelance writer Leslie Crawford also contributed to this story.*



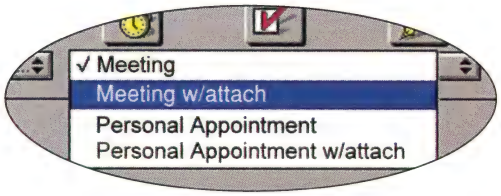
SETH RESNICK

# Introducing solutions to the most annoying problems facing business today.

(No, this isn't an ad for a new line of copiers.)

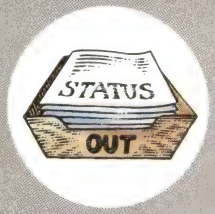
# How to get eight people in the same conference room at the same time.

(Bagels and donuts not required.)




If you've ever tried to arrange a meeting, you know the degree of difficulty is somewhere between nailing a triple gainer with a half twist and eliminating the national debt. It's not for amateurs or the faint of heart. But all that's about to change. Introducing GroupWise 4.1, a new member in the family of Novell GroupWare. GroupWise capitalizes on the advancements of its predecessor—WordPerfect® Office 4.0—and offers features not found in any of its competitors. For instance, with the Busy Search feature of the integrated e-mail calendar/schedule program, you can quickly determine the best time for 8 (or 80) people to convene. Regardless of their locations or operating systems. More than message-based scheduling, GroupWise integrates task management, so you can delegate an assignment, track its acceptance and manage its completion before the first attendee arrives. With GroupWise, we've made it incredibly easy to set up a meeting. Of course, you still have the daunting task of keeping people awake in one. Call **1-800-370-8992** for your nearest certified reseller or to learn more about Novell GroupWare, the perfect way to put people together with information.

*Rules—Out of the office? Maybe you're at another meeting? Using the Rules option on GroupWise 4.1, you can have your messages forwarded, delegated or filed.*




*Out Box—It's one thing to send a message, it's quite another to know whether it's been received. The unique Out Box allows you to track the status of all outgoing messages. It's like the difference between sending mail first class and certified.*

*In Box—Conversely, we've also made it easy to receive messages. The special In Box receives all e-mail, phone messages and faxes, then filters, sorts and files messages according to your preference.*

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InForms

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GroupWare

# How to listen to your e-mail when you're miles from your computer.

(Or civilization, for that matter.)

Important documents are streaming across your desktop. Appointments are changing by the minute. And you? Well, you're stuck in Flatsnake, Nevada, where the height of technology is a '49 Packard with Dyno-Glide transmission. Fortunately, someone at your office has installed GroupWise 4.1, with the optional Telephone Access Server featuring a unique text-to-speech translator. Meaning you can access your e-mail, appointments and tasks with nothing more sophisticated than a telephone. GroupWise also enables you to set up rules to automatically file, delegate or forward your messages. You can, for instance, review a document on the phone and have it faxed to its next destination. While none of this will make your short stay in Flatsnake any more enjoyable, it can make it more productive. Call **1-800-370-8992** for your nearest certified reseller or to learn more about Novell GroupWare, the perfect way to put people together with information.

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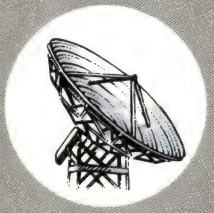
*Task Management—More than an integrated e-mail calendaring and scheduling program, GroupWise 4.1 can delegate tasks, monitor their progress, even note their completion.*



*Wireless—If you have a laptop with a wireless modem, you can access your messages from just about anywhere, provided there's cellular support. That could include places more remote than Flatsnake, NV.*

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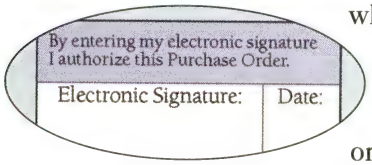
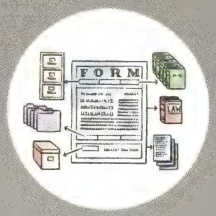



# InForms™




*Databases—Wouldn't it be nice if there were a front end that could connect you to 19 of the most popular databases as well as access and update multiple databases on the same form? No, that wouldn't be nice, that would be InForms.*

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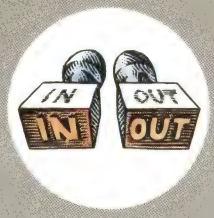
# How to find a document in five seconds that no one has seen in the last five years.

(Or the last five mergers.)




*Check-In/Check-Out—A true document manager, SoftSolutions can control who "checks out" information, when that information is checked out, and the condition it's in when it gets "checked back in."*

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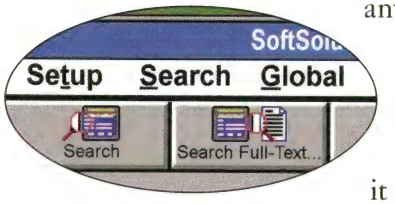


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As you can see, Novell GroupWare is quite comprehensive, with everything from integrated e-mail calendaring/scheduling/task management to electronic forms and document management. But it's by no means the end of the line.

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For your nearest certified reseller or to learn more about Novell GroupWare, call this 24-hour toll-free number:

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# About Face

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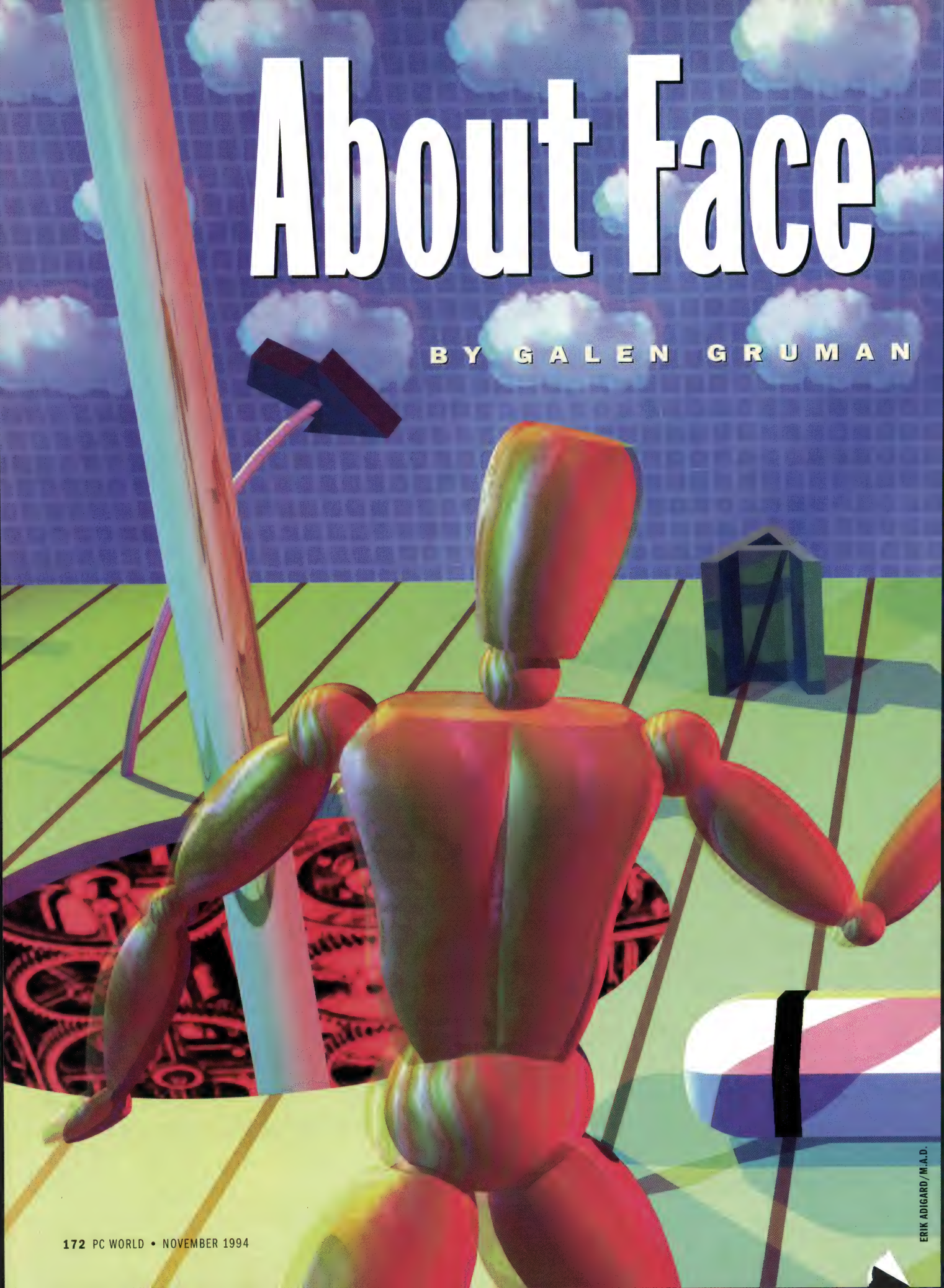


ERIK ADIGARD/M.A.D.

# Major software companies are sinking billions of dollars into new interfaces. What will your desktop look like in two years? And in ten?

**Don't get too comfortable.** Just as we've settled into the latest graphical interfaces, the world is about to change—again. We've become more sophisticated, more demanding. We expect our computers to be simpler to use, easier to master, more flexible, and more functional. Software companies are responding: Microsoft is readying Chicago, recently christened Windows 95; Apple is preparing Copland, the code name for a major upgrade to its System 7 operating system for the Macintosh; and IBM continues to retool the venerable OS/2, while developing the Workplace OS and collaborating with Apple and Hewlett-Packard on next-generation operating system Taligent. And from software developers large and small, we can

expect metaphors, guides, electronic personalities, animated agents, feedback, and graphical environments as likely to overwhelm as to enchant.

What will these options mean for you? Change, to be sure, but also more freedom of choice. Within the next few years, you may find yourself playing the operating system market. Should you continue to buy the software in which you've already invested your energy and money, or is it time to consider something new and different? How can you keep from buying into a dead-end technology? And if you do switch, when should you make your move? Advance knowledge is the best defense.

### Interfaces Get Real

The DOS command-line interface may seem primitive today, but issuing direct, English-like commands was once a revolutionary idea; a powerful way to make computing more accessible to professionals. Unfortunately, it was neither intuitive nor flexible, and it eventually gave way to graphical user interfaces (GUIs) like those used in the Macintosh Operating System and in Windows. GUIs use representational icons of real objects—say, a trash can that indicates a place to discard files—to help users perform tasks. Windows and the Mac OS use "reaching in" interfaces: They require you to use a device such as a mouse or keyboard to manipulate the objects representing your data and tasks. This type of interface has continued to evolve—first, to make the representations more intuitive; and second, to make the interactions with them more fluid, through methods like drag and drop.

The newcomer is the "real world" interface, which puts you "inside" a highly realistic, often 3-D setting where the mouse represents you, not just your fingers. This style, popularized by games like Broderbund's Myst, is now entering the mainstream. For instance, the interface of Meca's Managing Your Money is a cartoonish desk, while the initial screens of two online services—Sierra Online's ImagiNation Network and Apple's eWorld—are stylized "towns" where you click the Newsstand to enter a news section, or the Learning Center to get educational programs. General Magic's Magic Cap, developed for a forthcoming series of personal information devices, employs a cityscape metaphor. Lotus Organizer, a personal information manager, takes realism even further, with an interface that deftly mimics a paper-based Day-Timer organizer.

So will developers abandon the reaching-in interface of today's mainstream GUIs for the lure of the real world? Don't count on it. Interface developers agree that the reaching-in metaphor needs refinement but is nowhere near the end of its life. For one thing, a well-implemented GUI *can* make computing easy to comprehend. Besides, the real-world interfaces to date "have barely scratched the surface," says Scott Converse, group manager of research and development for Apple's eWorld.

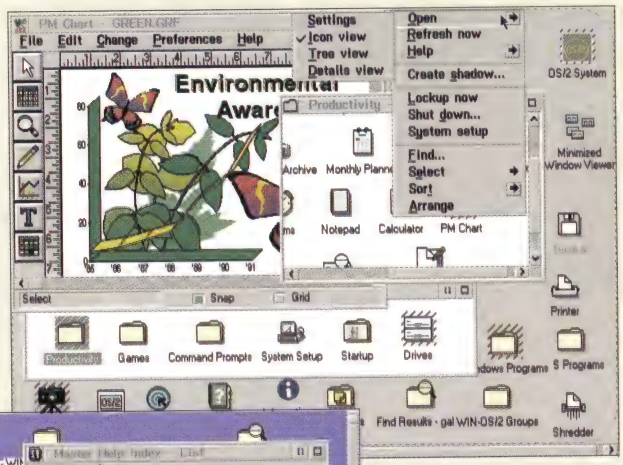
### Big Business Admits Fun Is Okay

Nolan Larsen, WordPerfect's director of human factors development, agrees. "These real-world approaches need to be compelling enough so people will abandon the desktop metaphor to use them," he says. Larsen instead expects real-world interfaces to augment today's GUIs. The richer approach of the real-world style will get a foothold in the consumer product market before creeping into the business world. "Real-world interfaces are very engaging," says Larsen, which helps keep employees interested and involved in work. Fortunately, says Joy Mountford, former director of interface development at Apple's Advanced Technology Group and now a project man-

## Computing in Context

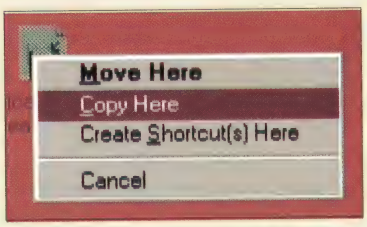
**Originally codeveloped by Microsoft and IBM in 1987, IBM's OS/2 Presentation Manager looks and acts a lot like Windows (the current version, 2.1, is shown at top right). A notable difference: OS/2 uses context-sensitive palettes, which provide current options for (and information about) files and programs. The forthcoming version of OS/2—code-named Warp—bears a striking resemblance to its predecessor. OS/2 popularized the use of pop-up option lists, activated by the right mouse button. Alone among the popular graphical interfaces, OS/2 separates selection and drag-and-drop functions between the left and right mouse buttons.**

*OS/2 2.1*



*OS/2 "Warp"*

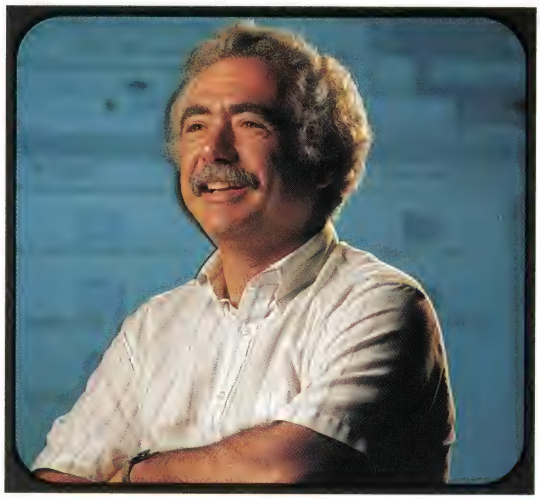
**Windows 95 will follow OS/2's lead, with context-sensitive pop-up menus—triggered by the right mouse button—providing shortcuts to available options.**




*Windows 95*

ager with Palo Alto, California, computer think tank Interval Research, "big business has begun to admit that fun is okay."

Fun aside, there is some concern among developers that a radical departure from the standard desktop interface will confuse and even alienate users. For example, Meca developers originally resisted the virtual desk interface because they feared that users would be unwilling to trust their finances to a cartoon. But the developers were overruled, and the reaction from users has been unexpectedly positive, says Bart Barker, Meca's vice president of design. Still, the developers made sure users have the option of skipping the virtual desk in favor of a more conventional look. Edmark's KidDesk shell for Windows and Apple's At Ease shell for the Macintosh take a similar approach, simplifying interaction with the operating system for children, while letting adults (or savvy kids) choose the traditional interface.



**The separation of phone and computer or TV and computer is artificial, historically necessary only because of their different technological roots.** —Terry Winograd, Stanford University

### Courting New Users

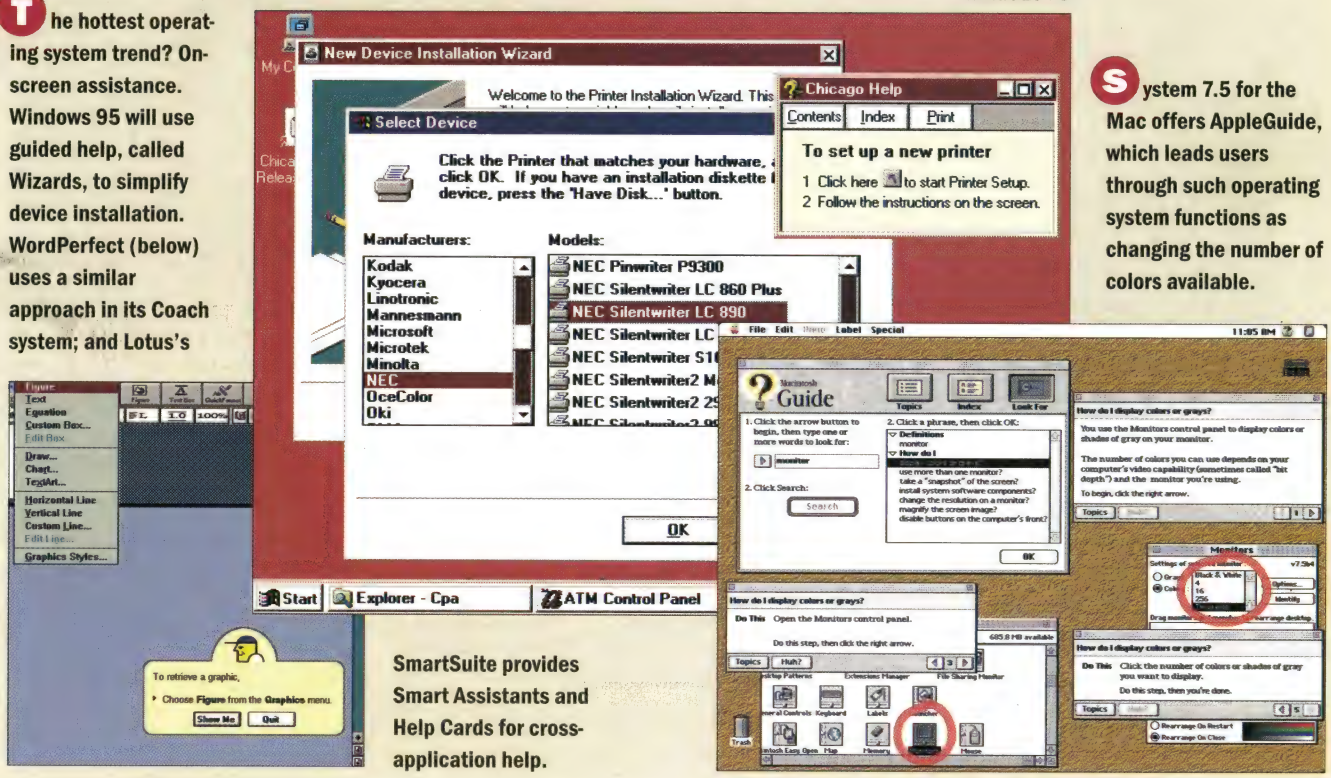
The impetus for much interface development is the new user, who presumably will be drawn to an already familiar real-world approach. And while software developers often equate *new user* with *home user*, in reality "all users are new users the first time they use something, no matter how much computer training they have had," says Kathy Potosnak, manager of the user experience group at Aldus.

To lure beginners, WordPerfect and Aldus offer different interfaces for product lines aimed at novices, while Apple has experimented with offering a home-office version of its operating system. Microsoft is reportedly working on Utopia, a simplified interface designed specifically for home users. And personal digital assistants like the Apple Newton, the Tandy Zoomer, Microsoft's WinPad, and forthcoming devices based on Magic Cap will offer interfaces heavy on real-world metaphor.

New users need more than inviting graphics; they also need an interface organized to help them know what to do. Joe Belfiore, Microsoft's lead program manager for shell and user interface, points to the new Start button in Windows 95, the next

## Help Is on the Way

**The hottest operating system trend? On-screen assistance. Windows 95 will use guided help, called Wizards, to simplify device installation. WordPerfect (below) uses a similar approach in its Coach system; and Lotus's SmartSuite provides Smart Assistants and Help Cards for cross-application help.**




*Windows 95*

**System 7.5 for the Mac offers AppleGuide, which leads users through such operating system functions as changing the number of colors available.**

*WordPerfect for Windows*

*System 7.5*

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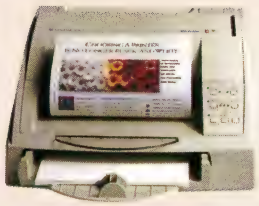

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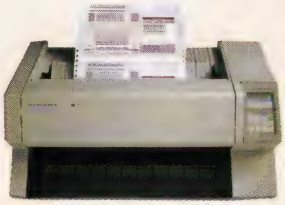

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TEXAS INSTRUMENTS

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version of Windows. Because the button is by far the most prominent element on Windows 95's opening screen, new users have little problem getting started, Belfiore explains. User testing at Microsoft revealed that the Windows 95 approach let new users figure out how to launch a program in 1½ minutes, compared with 9½ minutes under Windows 3.1.

### Attack of the Button Bars

Whether designed for new or experienced users, accessibility is a key ingredient to good interface design. Consider the button bar, popularized by Lotus, which seemed to take the computer world by storm just a few years ago. Practically every new application and desktop replacement utility features some sort of icon strip launch bar or palette that makes common functions easier for users to access.

But too many buttons can lead to icon burnout: Soon the images make no sense and users restrict themselves to using just icons they know. Ironically, interface developers have long known that "icons coupled with text communicate better than icons or text alone," says Paulien Strijland, manager of the human interface design center at the AppleSoft division of Apple. While many button bars still rely only on icons, that's starting to change. Micrografx applications like Draw led the charge, with text IDs that appear in a status bar when the pointer passes over an icon; Microsoft Office followed, with text bubbles that pop up whenever the pointer rests on an icon; and now Lotus, WordPerfect, and other companies are adding pop-up text labels to their applications as well.

**People prefer to deal with a person, or at least a personality. IBM's proposed solution is "Charlie," an animated talking head that will help PC users learn tasks.**

## Yesterday, Today, and Tomorrow

Computer interface design has come a long way since the Altair excited the oscilloscope-and-ham-radio set in the late 1970s. Back then, you programmed your computer by flipping levers. Soon Apple, IBM, and others—borrowing an idea from mainframes—adopted the command-line interface still used by DOS. It was a huge advance, because it allowed users to interact with their PCs via typed-in words.

In 1984, Apple tapped ideas coming out of Xerox's Palo Alto Research Center—a pinnacle of computer-science thinking—to introduce the Macintosh. Because it used a familiar metaphor (the desktop) and a human approach to interacting (pointing, grabbing, and moving), the Mac was embraced as an easy-to-use computer. Today, the original Mac interface looks cute but seems woefully limited. Back then, however, it tantalized and seduced people from all walks of life.

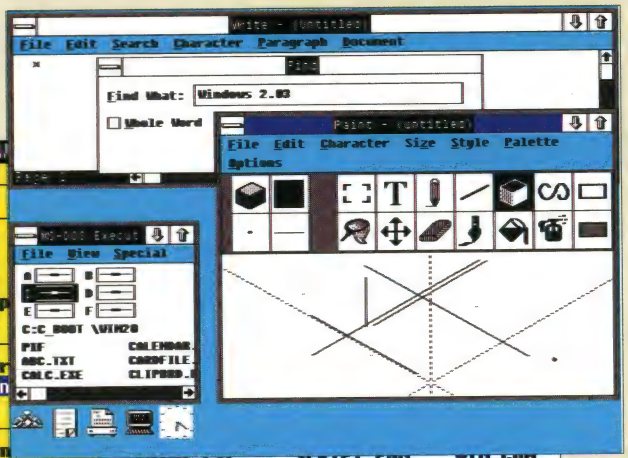
Other companies were exploring similar concepts: Digital Research had GEM, VisiCorp offered VisiOn, and Microsoft was brainstorming on Windows and collaborating with IBM on OS/2. Xerox itself had Star. Ultimately, though, most of the competition fell by the wayside.

Microsoft itself stumbled in 1985 when it released Windows 1.0, a poor imitation of the Mac OS. Slow and bloated, it made little headway with users until version 3.0 came out in 1990. Still a sluggish performer, at least it offered a workable interface. And it ran on DOS machines, which were populating desktops everywhere.

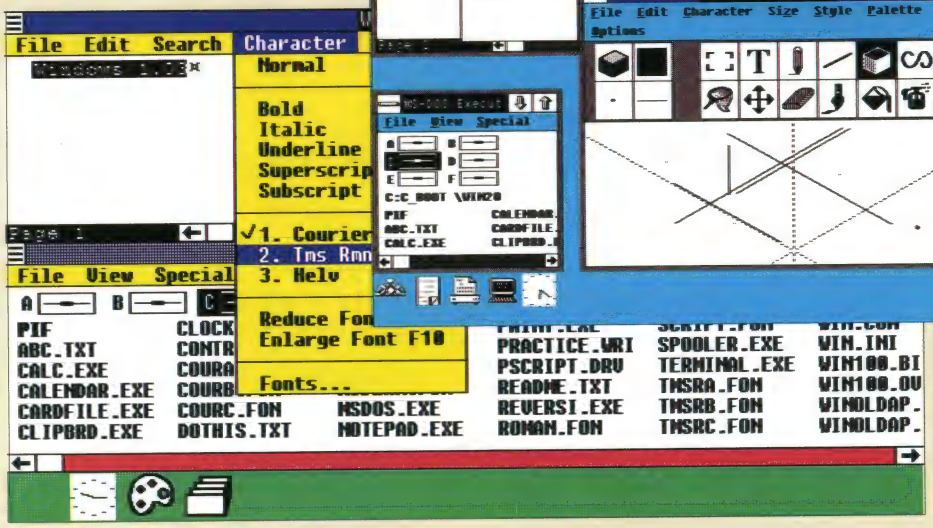
Suddenly the Mac, with its touted System 6, had real competition. In 1992 Windows 3.1 took the lead for good by fine-tuning performance and adding drag and drop, OLE, scalable type, and greater stability. Apple countered with System 7, but it arrived too late to slow Microsoft's momentum.

If anyone can crash the Apple-Microsoft party, it will be IBM. 1993's OS/2 2.1 has reemerged with about 4 million users, compared with 35 million for Windows and 10 million for Mac. Sporting a Windows-like look—menus, icons, and so on—it introduced preemptive multitasking and other advanced technologies not found in Windows or Mac. And OS/2 should gain even greater market share with the release of Warp, the next version of OS/2, slated for the end of this year.

**Windows has evolved significantly since 1985's version 1.0. Version 2.03, introduced in 1987, offered fully resizable windows and a cleaner interface. Version 3.0, from 1990, added program and file icons, plus a graphical File Manager. 1992's Version 3.1 added drag and drop and scalable**




*Windows 2.03*




*Windows 1.0*

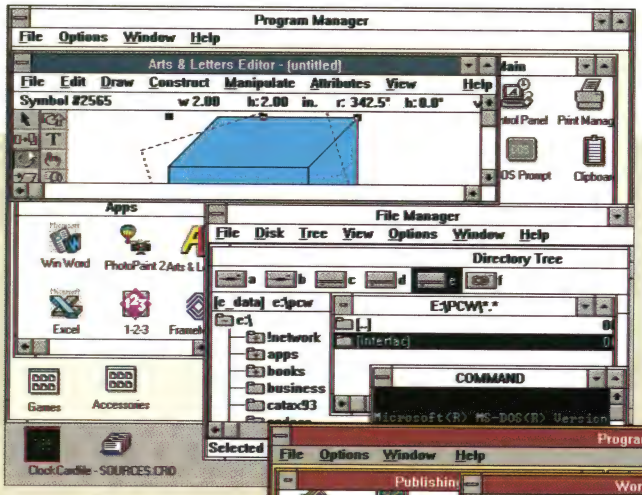
Buttons, palettes, status bars, menus—there can be so many of them that you have no room on screen for the actual work you're doing. To combat this icon glut, the suites from Microsoft, Lotus, and WordPerfect all allow you to customize the button bars, and the new Adobe Photoshop 3.0 improves on the concept by letting you create sets of icons placed in expandable, tabbed palettes—click a tab to summon the icon bar you want. And back at the system level, the forthcoming Windows 95 adds tabbed dialog boxes of its own—a clever way to avoid screenfuls of overlapping dialog boxes. A single dialog box labeled Properties of Display, for instance, has tabs for Background, Screen Saver, Appearance, and Settings. You'll be able to click, say, Appearance to bring up options for changing your Windows color scheme; or click Screen Saver and, instead of cluttering the screen with a new dialog box, your color-scheme options are replaced with options for changing your screen saver.

Such niceties are really window dressing for any interface's primary task: helping users access data. Whether an operating system uses folders or program groups, what it really gives you is a tree hierarchy—a way of organizing information (in this case, files) into subgroups that are part of other subgroups. But "people have a hard time learning to deal with hierarchy," says Microsoft's Belfiore. In DOS, it's easy to get lost as you use the CD command to jump from one directory to another. In Windows and on the Mac, you click folders until you find what you want, but the approach is really the same one DOS uses—it's still a tree, just prettied up.

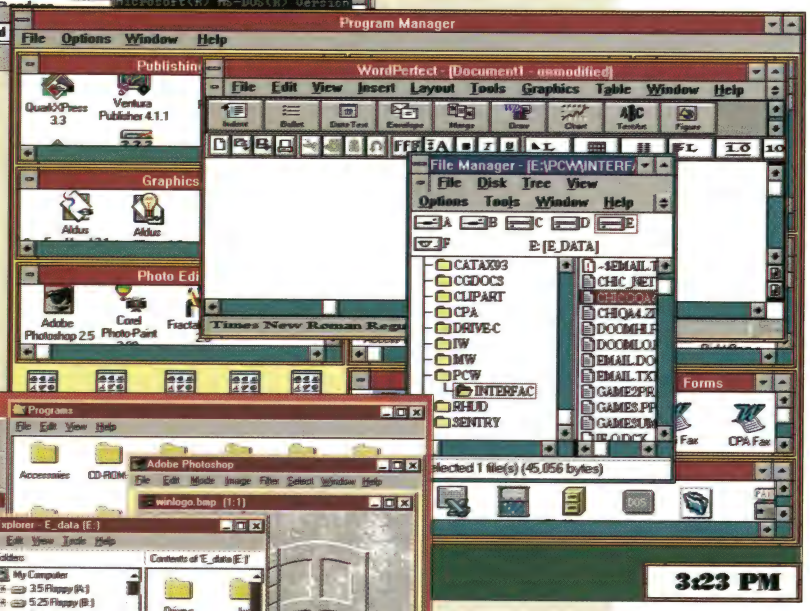
Interface designers are addressing this problem. Borrowing an idea from Apple's System 7, Windows 95 will offer Shortcuts—desktop icons that point to individual files or programs. Double-click an icon labeled Shortcut to Ami Pro, for example, and you bypass the tree structure, jumping directly into your word processor. Unfortunately, a desktop scattered with Shortcut icons is no easier to navigate than a tree. "The human mind likes between three and seven levels of hierarchy," says Apple's Converse. "Put too much [on screen] and we're lost: We can't find anything."

One solution is a search facility, which already exists in crude forms in Windows, the Mac Finder, and elsewhere. Future search utilities will allow more context, so you can find files created by a certain program, modified after a certain date, and containing information on a particular topic. Another option is the viewer, related to the search utility, which lets you look at the contents of a file regardless of its format. While most Windows desktop utilities have viewers now, Windows 95 will have its own utility for viewing selected files.

IBM is developing a next-generation search engine with a new version of its venerable DB2 database manager, which will use pattern matching to catalog graphics. You'll be able to draw a shape, apply color to it, and ask DB2 to show any matching images. DB2 will then sort and display the images according to how closely they approximate the shape you've drawn. The

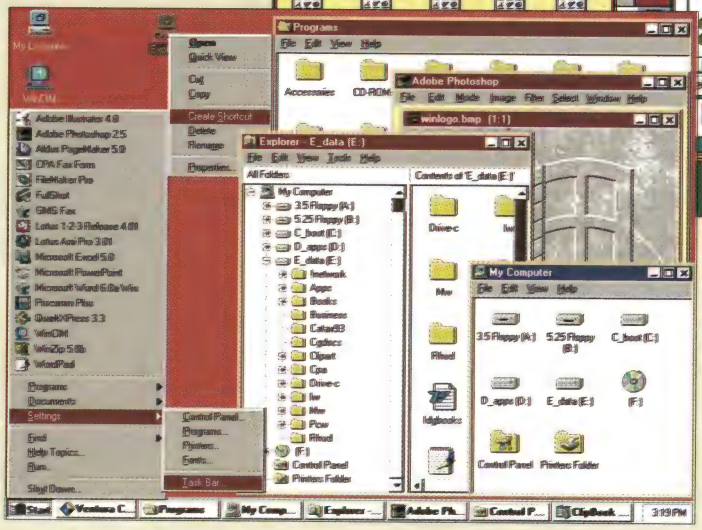



*Windows 3.0*




*Windows 3.1*

**type. Windows 95 will simplify startup, make guided help part of the operating system, integrate the Program Manager and File Manager, and provide shortcut icons and palettes.**




*Windows 95*

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# IDC Insight: An

INTERNATIONAL DATA CORPORATION

# Gaining Competitive Advantage

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If your company's mobile sales people, service reps, and other field employees routinely use mobile computers in their daily work, then your company may be gaining a significant competitive advantage.

This is the key finding of a recent survey of 400 large and medium-sized U.S.organizations conducted by International Data Corporation (IDC), the world's leading information technology market research firm.

Pursuing a competitive advantage requires investment and planning. Field force automation is more than just equipping sales or service people with the latest notebook computer and contact manager software package and hoping for the best. It requires a systematic approach to acquiring technology, training and supporting field personnel and writing or buying software.

This IDC Insight analyzes the experiences of businesses and government agencies already engaged in field force automation. IDC conducted in-depth telephone interviews with information systems professionals and field managers at companies from a variety of industries.

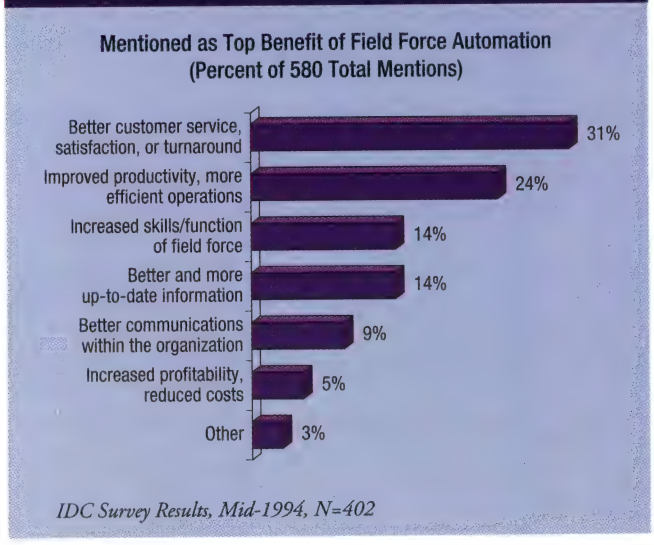
Key findings are recapped in the sidebar. An in-depth summary of the survey is available in a special *IDC White Paper on Field Force Automation* (see box, bottom far right).

**For companies that make the commitment in time and money to field force automation, the payoffs are real.**

**Key Findings**

- Over 70% of large and medium-sized organizations are in some phase of field force automation.
- Field force automation is not new for most companies. Over a fifth of those polled were in their third generation of field force automation.
- The key benefits came from productivity improvements and better customer service.
- Key success factors include top management support, training, and a good working relationship among the departments involved.
- The biggest impediments to successful implementation were resistance to change on the part of the sales force and flagging top management support.

**Figure 1 — The Benefits of Field Force Automation**




### Going for the Brass Ring

Automating a field force is no easy task. Nor is there a single standard for systems development—applications can be as simple as providing e-mail support for sales people or as complex as custom-built applications that interface mobile computers with corporate databases.

But for companies that make the commitment to field force automation, the payoffs are real.

The benefits received by the organizations polled are quantified in Figure 1. Most come through better customer service, improved field force productivity, or more sophisticated or efficient field force operations.

Quantifying these benefits of field force automation requires a measuring stick, and the companies polled generally rated their success at field force automation, in ranked order, using:

- Internal productivity measures, such as transaction time, support headcount, or even sales quotas.
- Customer satisfaction benchmarks, e.g., formal customer evaluations, call handling statistics, or repeat business.
- Measurement of field force satisfaction using surveys as well as continued willingness to fund.
- Financial returns, such as increased revenues or profits or formal return-on-investment (ROI) calculations.

The ultimate payoff from field force automation should be sustainable competitive advantage. Here survey respondents gave automation a vote of confidence. Of the 42% that considered their automation efforts ahead of peer organizations, 63% felt that they had

# Executive Briefing

# through Field Force Automation

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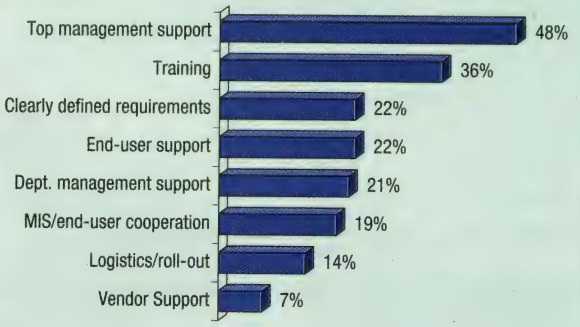
**Figure 2 — The Keys to Successful Field Force Automation**

**What to Pay Attention to in Implementation (Percent of Leading-Edge* Companies Mentioning)**




** Companies rating themselves as further advanced than competitors in field force automation and having a competitive advantage as a result*

*IDC Survey Results, Mid-1994, N=94*

gained a competitive advantage as a result. This advantage generally meant getting more bang for the buck out of the field force: more qualified leads called by sales people per day, shorter mean-time-to-repair for maintenance technicians, and less downtime for on-site auditors, programmers, or project engineers.

### Critical Success Factors

IDC asked respondents who felt they had achieved competitive advantage through field force automation what they considered the critical success factors. Figure 2 ranks these factors.

The success factors are not surprising. But they point out the importance of selling field force automation to multiple constituencies and maintaining that support.

Respondents to the survey recognized the need to see field force automation as an ongoing process requiring continual investment and support to provide the maximum payback.

IDC believes that the ongoing nature of field force automation triggers yet another success factor: an organization's relationship with its supplier and its choice of technology. To support a mission-critical application like field force automation, organizations should consider the vendor of their mobile computers as a business partner—not a commodity supplier. This means evaluating the vendor on:

- System reliability
- System portability
- Availability and support
- Reputation and viability
- Technology replenishment

A well-chosen supplier understands the ongoing nature of field force automation and supports its customers with a long-term program for technology insertion and asset management.

The products need to be durable, easy to use, easy to network, and they need to support common operating systems. Battery life, screen quality, and industrial design will be crucial. Only after a vendor and its products fit these criteria should product price become a major factor.

The cost of the hardware, after all, is a small part of the total cost of implementation.

### The Call to Action

The paybacks already achieved by companies using field force automation should motivate others to increase their automation efforts.

Automating sooner is better than automating later. Much of the success of field force automation relies on skills and experiences built over time; organizations not automating today run the risk of falling even further behind.

If there's a single message emerging from the research, and examined in *IDC's White Paper on Field Force Automation* (see below) it's this: Field force automation is no longer an experiment in technology. It's a mainstream way of doing business.

*– John Gantz*
*Senior Vice President*
*International Data Corporation*

**Maintaining the Edge**

Once a field force automation application is up and running, success factors change. Leading-edge companies considered the following most critical:

- Continual upgrading of hardware and software: 31% of respondents.
- Continual investment in training: 25%
- Ongoing support for end users: 20%
- Management support: 16%

*This Insight was written independently by IDC and sponsored by Dell Computer Corporation. For a complimentary copy of IDC's full White Paper on Field Force Automation, please call Dell at 1-800-396-3040.*

DELL

IBM system requires a workstation-class computer running UNIX, but by the time this article appears, Apple should have released PhotoFlash 2.0, an image cataloging and touch-up application that can rank images by how closely they match a selected image. Similar tools for other desktop machines can't be too far behind.

### Talking Heads Give Help

With the increasing complexity of programs' feature sets, providing on-screen help becomes critical. "People's needs tend to fall in three classes," says Aldus's Potosnak. "'Just do it for me,' 'Lead me through it,' and 'Watch as I do it and make suggestions.'" Whether they employ a Wizard from Microsoft, an Assistant from Lotus, a Coach or Expert from WordPerfect, or a Guide from Apple, most major applications are now addressing all three of these user requirements. The next version of Novell-WordPerfect's Perfect Office, for example, will have an Expert that builds a budget for you, even supplying a canned list of common expenses. But dialog boxes offering advice may soon become passé. IBM is working on Charlie, a prototype electronic "personality" for its PowerPC-based computers. An animated talking head, Charlie will help users learn tasks. And both Packard Bell and AST Research now offer multimedia guides to talk novices through the basics of using a computer.

Tom Firman, vice president of human-centered computing at IBM's Power Personal division, likens interaction with a typical desktop interface to talking to an answering machine: People prefer to deal with a person, or at least a personality. Firman sees personalities being used in help systems, in training, and for that "out of the box" experience, when you set up your computer for the first time. "Personality gives a computer a point of focus," he says.

Other applications and operating systems will provide active help by looking over your shoulder, much as Microsoft's Word 6.0 for Windows corrects common typos as you make them. "Active help will almost certainly play a role," says Apple's Converse, "but it must be done in a way that isn't intrusive to the user. People want to maintain both confidence and control over their environments."

Besides, there are limits to how much a program should help. "Paint stores don't stop customers from getting paint that clashes," says WordPerfect's Larsen, and neither should a presentation program. "Though we do have the responsibility to offer users reasonable alternatives. I think we'll kind of creep up on [active help]."

**I see your computer becoming your TV. We will have digital wall screens, and cable services will be the equivalent of a CompuServe merged with a CBS.** —Frits Habermann, Aldus

### Just One Look

If active help is approaching at a crawl, another learning aid—consistent look and feel—is coming at a full gallop. Today's popular GUIs all strive to provide consistent dialog boxes, menus, interapplication communication, and data exchange throughout. This sort of conformity makes it easier for users to get up to speed. The application suites have pushed this trend even further, with Microsoft Office, Perfect Office, and Lotus SmartSuite all attempting to integrate the constituent programs so they work more like each other. In fact, Microsoft is transforming its Office suite into an operating environment—encouraging developers to write applications that look and feel Office-like. And Novell-WordPerfect has a similar program, called PerfectFit.

"There's a trend of applications imposing their own interface onto the operating system," says Eric Zocher, director of engineering for applications at Adobe Systems. "It's the next level of standardization." First the operating system interface was standardized, then came integrated programs. Now it's suites and cookie-cutter add-on utilities. "It's a good idea," Zocher says, "to go too far, if you will, in consistency. Then people who use a word processor every day can work with a less frequently used tool as well." Zocher advises, however, against slavish consistency. For example, he says, "Adobe Illustrator, Photoshop, and Premiere should look a little different, because they do different things."

### The Document at the Center of the World

Related to consistency is the effort to focus the user's attention on the task, not the application. Microsoft's OLE 2.0 and the Apple-led OpenDoc scheme—which both provide standard methods for exchanging data between applications—place the document at the center of the work flow. Menu bars and palettes come and go as appropriate for the activity you're engaged in, and you never consciously have to change from one application to another to perform a task.

This document-centered approach will eventually let you choose the tools you like, mixing and matching plug-in components from a range of companies—a spelling checker here, a slide-show engine there. WordPerfect's Larsen believes suites are "the first generation of component software." He compares the component-document approach to the auto industry, which sells different types of cars for different users. The cars offer some options, but customization is limited: Customers might be able to choose a different stereo system, for example, but not add air bags or convert the car into a truck. Larsen believes that such a

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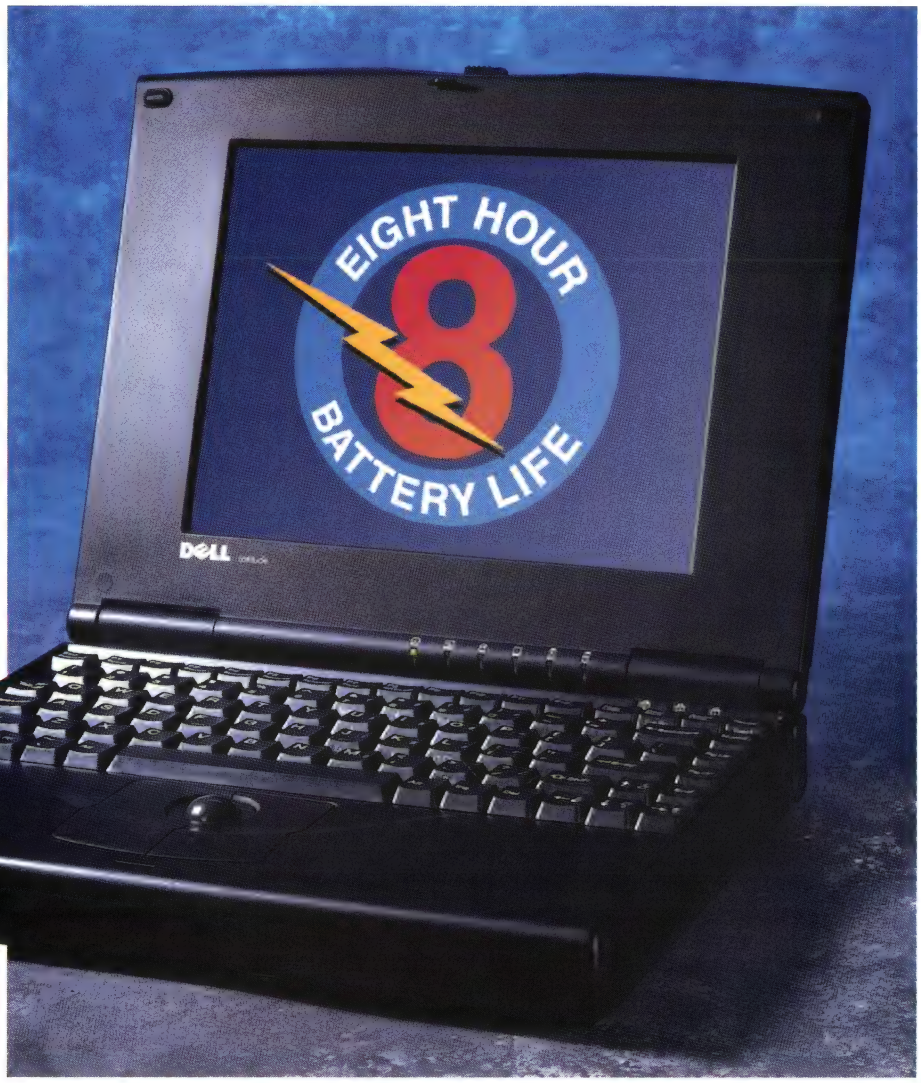


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| Dell Latitude XP DX4/75 STN | 16:01 |
| Dell Latitude XP DX4/100 TFT | 14:48 |
| Dell Latitude, 2 NiMH batteries DX2/50 STN | 12:15 |
| OLD RECORD FOR 486 MONO: | 12:07 |
| IBM ThinkPad 350C (SL/25) passive | 8:50 |
| IBM ThinkPad 500 (486/slc) mono | 6:30 |
| Toshiba T4800ct (DX4/75) TFT | 5:30 |
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prepackaged tool set will end today's "one size fits all" approach to software.

The People, Places, and Things interface being developed as part of the joint Apple–IBM–Hewlett-Packard operating system Taligent promises to make the document the basic metaphor. "We're not building applications, we're building components," says Mark Vickers, Taligent's chief technologist. "Everything already knows how to deal with everything else." Taligent will use places to represent areas of collaboration. Thus, Taligent would show two people working on an outline as objects in a virtual conference room, along with an object representing the outline. Taligent's first product—an application environment that will coexist with other graphical interfaces—is due next year, but only for systems running OS/2 and some versions of UNIX. A Mac version will have to wait for Copland, due out in late 1995.

### Customized Versus Standardized

The movement toward standardization and consistency within interfaces is a powerful one. But equally persuasive is a trend in the opposite direction—toward customization. Witness the popularity of the Norton Desktop and other desktop replacements for Windows. Applications are following suit, with customizable button bars, icons, and even menus.

But untrammeled customization can introduce confusion. Imagine co-workers unable to use each other's copies of, say, WordPerfect, since each has been customized differently. Aldus's Potosnak recommends that programs offers the option of resetting customized settings to default values, so a new employee inheriting someone else's computer isn't stymied. Future operating systems and applications will likely pursue this avenue, says former Apple interface guru Mountford. A computer will recognize who is using it and automatically adjust to that person's custom settings, even transferring the user's E-mail and passwords to it.

Clearly, customization will no longer be limited to setting preferences for your desktop wallpaper or keyboard shortcuts. Look at the emerging technology of personal digital assistants, such as the Apple Newton, the Tandy Zoomer, or the Magic Cap-based devices. A PDA doesn't feel much like your desktop computer. Will this confuse users? Maybe not. After all, microwave ovens, answering machines, and automobiles all feature different interfaces, yet we seem to manage using them all.

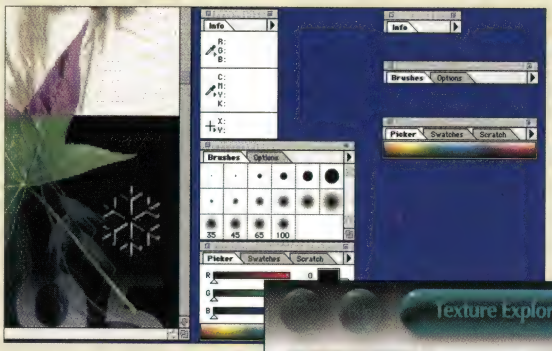
Indeed, as computers become more personal—à la Swatch watches or Motorola pocket pagers—and dedicated to a more specific set of tasks, their interfaces will continue to diverge. Mountford imagines that do-it-all computers will be phased out in favor of a set of appliances, just as most people today have a phone, a calculator, and a Rolodex (and probably a fax machine and a copier down the hall). The interfaces for each of these devices, Mountford suspects, will be tailored to specific functions.

### The Black Hole of the C> Prompt

Each successive wave of interfaces is aesthetically better. Compare the look of Windows from version 1.0 to Windows 95, for instance. There's no compelling usability reason for, say, adding color or 3-D buttons, except for the most basic reason of all: "People like them," Mountford says. WordPerfect's Larsen agrees. "One thing that gives the Mac and Windows such a wide appeal is that they open up the black hole of the C> prompt to a rich visual experience."

How far can appearances go? Many developers cite the work of Kai Krause, best known for Kai's Power Tools (KPT), a collection of plug-in modules for Photoshop. Krause's interfaces are dimensional, sculpted, and one-of-a-kind. "There's no reason on Earth [an interface] shouldn't be pleasing to look at," says Phil Clevenger, product

## Conserving Real Estate

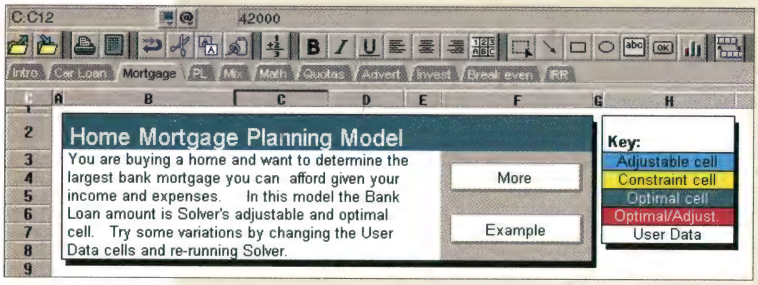


**Adobe Photoshop 3.0 helps reduce window clutter by using tabbed palettes (left). Minimized palettes (right) save even more room.**

*Adobe Photoshop 3.0*

**Kai's Power Tools provides a fun, aesthetically pleasing interface. It hides information not currently needed, which can slow learning but also removes elements that distract experienced users.**

*Kai's Power Tools*




**Lotus 1-2-3 release 4.0 for Windows popularized several trends now familiar in today's interfaces, including button bars and tabbed windows.**

*Lotus 1-2-3 release 4.0*

manager for KPT at HSC Software. But some people say Krause's interfaces are beautiful but nonintuitive; a common complaint is that KPT buttons are dimmed out until you place the mouse over them, so users may not know what their options are. "Kai believes it's condescending to have a button obvious when you're not using it," Clevenger explains. Once they've learned to use the tool, "people don't need the constant reinforcement."

Krause designs interfaces with three underlying goals: First, "they need to grab you in the first few seconds," Clevenger says. Then "they need to be learnable in the first 3 minutes." Finally, they should have "enough wiggle room so a few months later you are still engaged by them." While interface designers may quibble over the details, they agree on these basic goals, and they see plenty of room for making interfaces more engaging.

RICK FRIEDMAN

### Over the Horizon

What are the next areas to conquer? Sound, video, and 3-D images—now mostly the province of galactic shoot-'em-up games—hold tremendous potential. But sound works best when heard in a natural context, notes Adobe's Zocher. Using sounds to represent abstract or strictly visual ideas, such as linking an object or changing colors for a brush, will be ineffective, he believes. "Text processing and art are largely silent activities." But, he adds, sound will be important for real-time manipulation and interactive entertainment.

"3-D might become part of the operating system, but I'm not sure what the benefits are," says Zocher. "I disagree that the 2-D interface is going to go away like the text-based interface." Zocher and others see the 3-D interface being used for manipulation of 3-D elements. Apple, for example, has demonstrated a 3-D interface that uses perspective, shadows, and sound effects to ease manipulation of 3-D objects. So when two objects touch, say, you hear a thump indicating they have indeed made contact.

Agents, one of the most highly touted technologies to emerge in years, may actually become part of the common computing experience. Agents are semi-intelligent software programs that follow your instructions, gathering the information you request or performing actions you specify. General Magic's agent approach looks particularly promising: It's a sophisticated form of scripting that can make decisions based on parameters you set (or that it observes you following) for tasks like buying airline tickets through an online service.

A technology to do this—called Telescript—is a few years away from a desktop near you, but today's technologies already make crude agents feasible for the PC. For example, the combination of scripting programs (ranging from Microsoft's Visual Basic for Applications to Apple's AppleScript), expert databases, and guidance-oriented help can serve as the basis for capable agents that perform repetitive, rote tasks. IBM has been developing agent technology for years, but IBM's Firman agrees that in the meantime Wizards, Coaches, and the like "do about 80 percent of the work that needs to be done" by agents.

**Agents will encapsulate the work style—the procedures and approaches—of a company or department and help teach employees that style.** —Patty Maes, MIT Media Lab

### Speech and Handwriting: Alternate Input

As any *Doonesbury* reader knows, handwriting recognition, à la the Apple Newton, is still in its infancy. The recognition software isn't sufficiently accurate, and handwriting is nowhere near as fast as keyboarding for data entry, which means it will never be useful for massive data input.

"I see good handwriting recognition happening four years from now," says Andy Hertzfeld, Software Wizard (yes, that's his official title) at General Magic and a designer of the original Macintosh. "Of course, I felt that way four years ago."

Speech recognition is in a similar state of development. Some effective systems are available today, such as the Dragon Systems dictation system used for data entry by people with disabilities. But even these devices must be trained to your voice, and they require the speaker to insert unnatural pauses between words.

Still, "speech is a great way to change contexts," says IBM's Firman. For example, when you draw in a CAD program, having to go to the menu bar to select the zoom tool breaks your concentration; saying "Computer, please zoom" would not. And, says Firman, "the technologies are ready today" in the labs, awaiting systems to make them work. The real bottleneck, he argues, is the computing power needed, which only the recent Pentiums and PowerPCs can deliver. Expect Apple, IBM, and WordPerfect to offer more natural-speech-recognition capabilities in 1995.

As the recognition algorithms improve and desktop processing power increases, IBM's forthcoming PowerPC systems, Microsoft's Windows Sound System and Pen Extensions for Windows, and Apple's AV Macs will be able to more naturally integrate voice and handwriting into tasks that lend themselves to such input, like signing off on a form or commenting on a proposal. But don't expect *Star Trek* anytime soon: It will be many years before your computer will be able to conduct anything close to an intelligent conversation with you.

### Shootout at the OS Corral

IBM's Firman believes that the more radical technologies—sound, gesture, pen, video, speech, and agents—will have a dramatic effect on interfaces. "Put out a new technology, and you'll have some guy in Fargo, North Dakota, put out something fantastic." So should we fear a chaotic future? Relax—changes are in store, but

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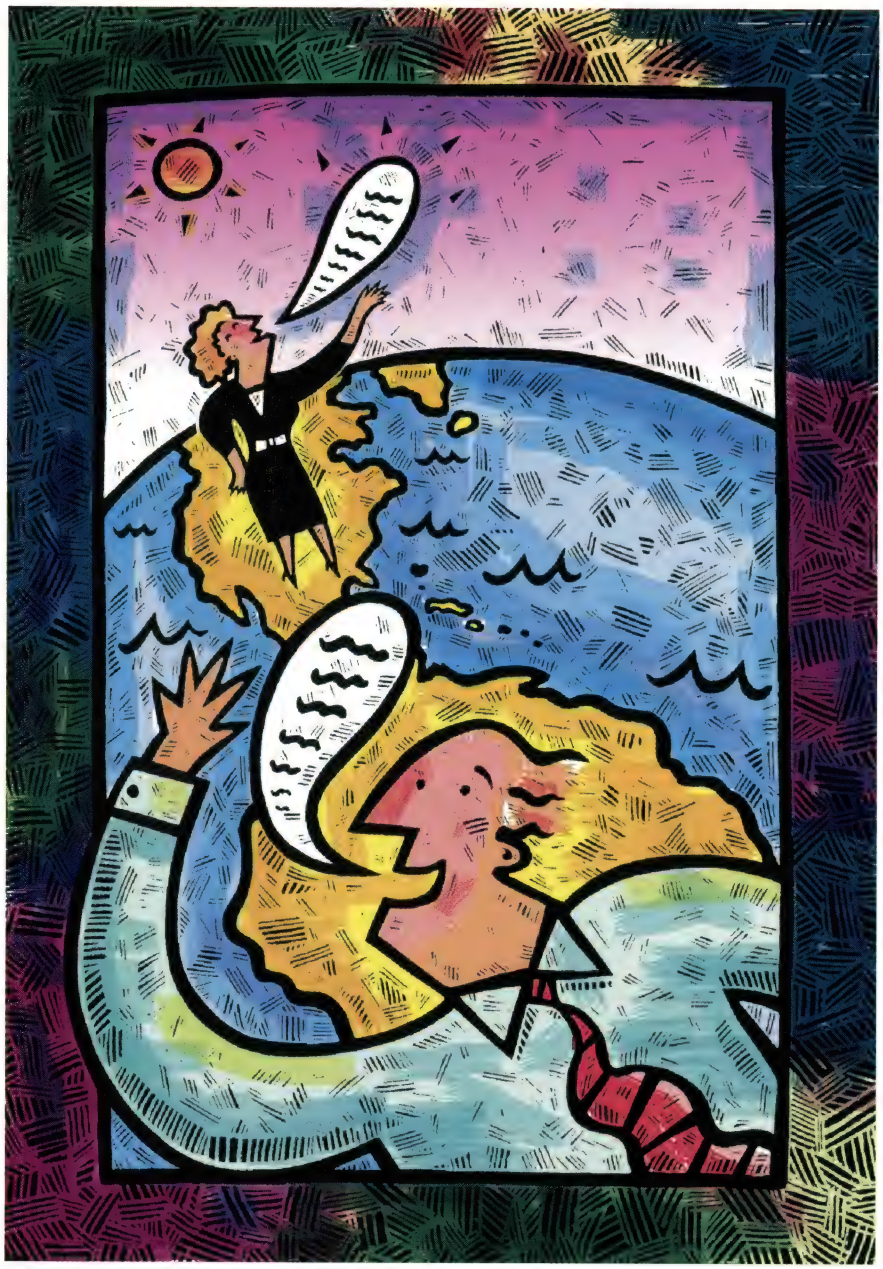

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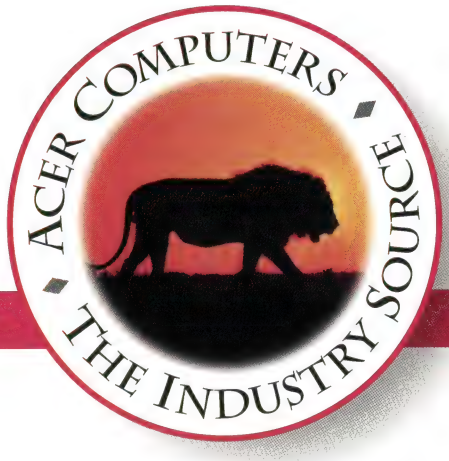

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they will be progressive, just as they've been in past interface transitions. The installed base of users is too large for willy-nilly course corrections. Besides, the complexities of application and data compatibility—the millions of dollars spent on software and the countless hours spent collecting, processing, and distributing data—will act as brakes, forcing companies to carefully evaluate changes in operating systems. In other words, if you use Windows now, expect to use Windows two years from now, though it may be a new version.

That new version, of course, will reflect the times. In the near future, interface styles will increasingly draw inspiration from dominant programs—suites today and perhaps OLE and OpenDoc tool sets tomorrow. Moving forward, those central programs will assert their interfaces more aggressively on other applications. Farther down the road—maybe a decade from now—future technologies and ever-increasing processing power will likely make today's interface technologies seem as quaint as an old DOS command.

While we're waiting, let's savor the many choices coming our way.

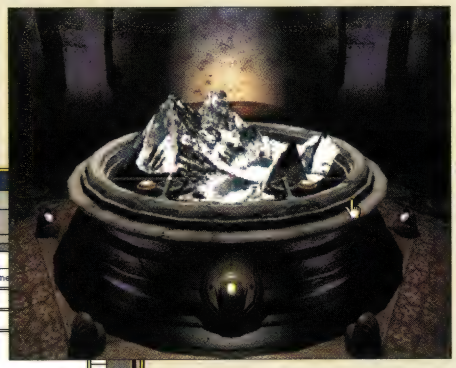
*Galen Gruman is a features editor for* Macworld *and the desktop publishing reviewer for PC and Mac software at* InfoWorld.

## The Real World

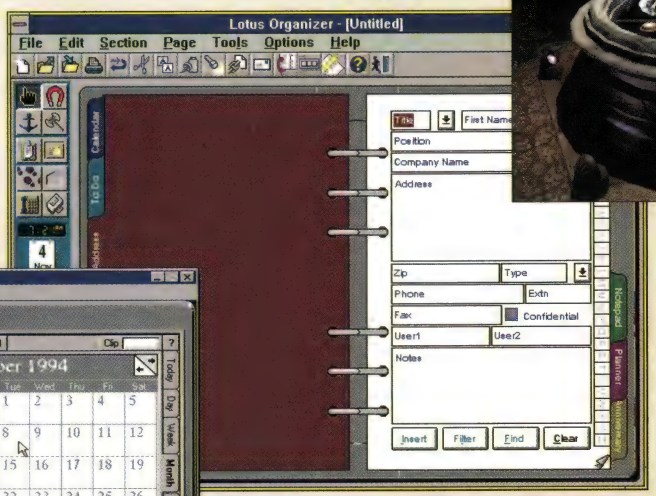
**The use of real-world objects is an increasingly popular way to aid new users. For example, Meca's Managing Your Money uses a cartoonlike desk to organize the program's features. Apple's eWorld online service organizes its sections according to a "town" metaphor. Edmark's KidDesk uses a similar approach to help children organize their view of the computer, while it provides a separate desktop for the adults in the house. More realistic is Lotus Organizer, which employs a real-world Day-Timer metaphor. Microsoft's forthcoming WinPad interface for personal digital assistants takes a similar tack. The MCS CDMaster utility mimics the interface of a familiar household appliance—the audio CD player—to make it more accessible. But games like Broderbund's Myst take realism a step further, bringing the user inside the computer.**

*Managing Your Money*

*eWorld*

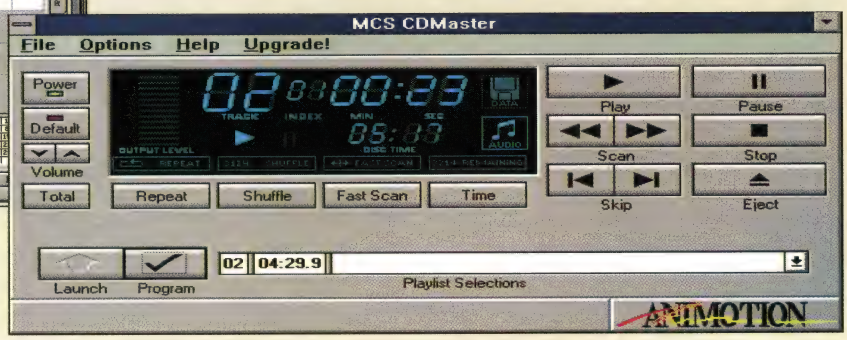


*Myst*

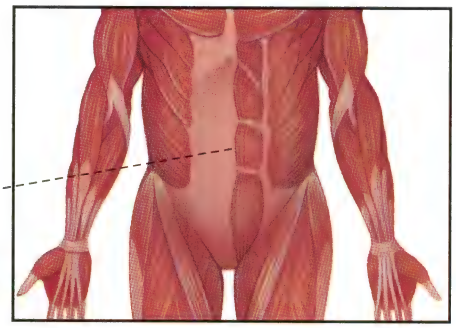



*Lotus Organizer*

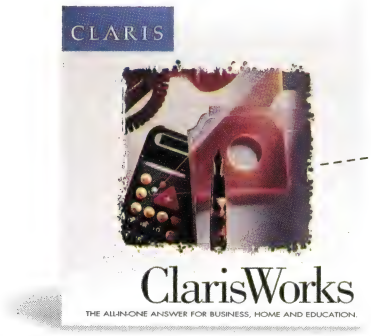
*Microsoft WinPad*




*MCS CDMaster*



*Guts.*

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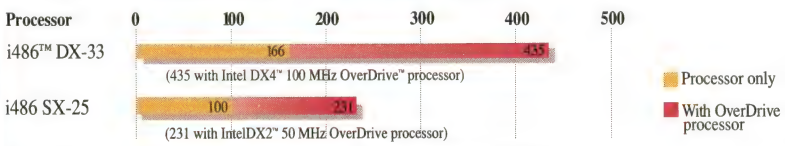


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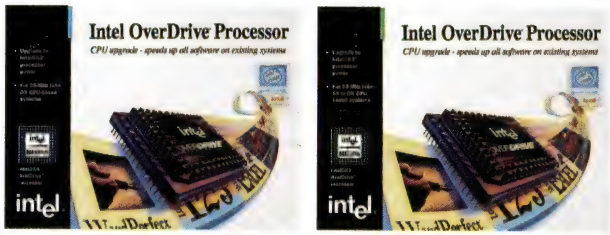


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# Top 20 PCs

As prices contract, values explode. November's Best Buys: Dell's Dimension XPS P90, Micron's 4100PCI Magnum, and Compaq's LTE Elite and Contura Aero 4/33C Model 170.

# The Shrinking Cost of Computing

This Month's Contenders pg. 199 • Power Desktops pg. 200 • Budget Desktops pg. 210 • Mobile PCs pg. 218

New England has a saying, If you don't like the weather, wait a minute.

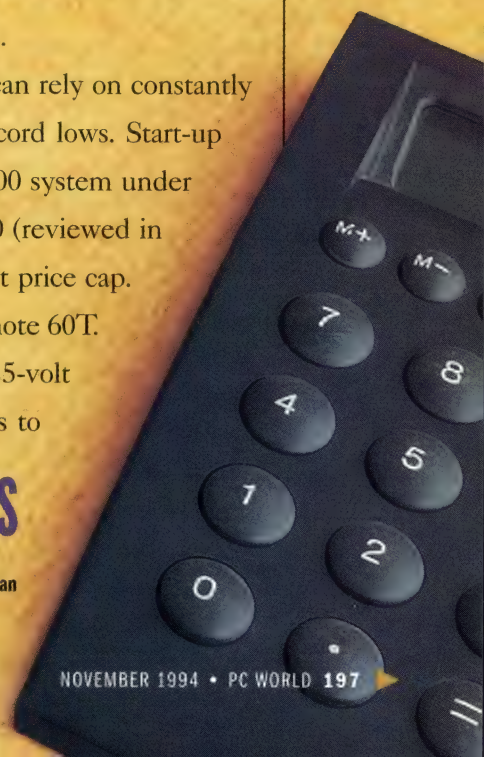
The aphorism applies as well to PC prices, except with PCs you can rely on constantly improving conditions. This month brings both record highs and record lows. Start-up FutureTech debuts with its System 4414A desktop, the first DX4-100 system under $2000. Diamond has dropped the price of its DT586-90 Pentium-90 (reviewed in August) to $2495, making it the first Pentium-90 to meet our budget price cap. Twinhead ushers in the era of Pentium notebooks with its Pentium-60 Slimnote 60T. While we don't expect to see many mobiles based on this power-hungry 5-volt processor, we do expect a number of faster, more energy-efficient Pentiums to show up in notebooks early next year.

A glance at the Top 20 charts shows the effect of the ongoing price slides. DX4-100 and Pentium systems have long dominated

By Bryan Hastings

Testing by Dave Casini, Ulrike Diehlmann, and Susan Silvius; research and support by Mike Salayko

STAN MUSILEK



the power desktop arena, but those PCs now account for nearly half the Top 20 budget desktops as well. These days DX4-100 desktops are slightly better performers on average than Pentium-60 desktops, and this month's DX4-100 notebook from FutureTech is the fastest mobile we've ever tested.

Although none of this month's PCs scores a number one Best Buy, more than the usual number get on base. Nearly half the 30 desktop and mobile PCs we review here appear on our Top 20s, the biggest influx of new systems on our charts since August.

The most action occurs among the high-end notebooks and subnotes. We are seeing serious desktop-level speed in the current power mobile PCs—most meet or beat the performance of an average DX2-50 desktop, while several even nudge past the typical DX2-66 desktop. Active-matrix color screens, 340MB and larger hard disks, and 5-hour-plus battery lives are fast becoming the norm.

Other stars of this roundup are Toshiba's Portégé T3600CT subnote, the QP5/90B-2 desktop from Quantex, and Micro Express's MicroFlex-VL/66G desktop. The Portégé T3600CT, an exceptionally lithe and powerful subnotebook, takes the number two spot for power mobiles. While $4199 is a lot to pay for a DX2-50 subnote, Toshiba did its homework: The T3600's performance equals that of a DX4-75 notebook, plus you get marathon 6.75-hour battery life, a beautiful active-matrix color screen, a large 250MB hard disk, and of course, Toshiba's exemplary service and support. Meanwhile, Quantex's QP5/90B-2, a Pentium-90 tower packed with power and peripherals, takes third place for power desktops this month. It includes a roomy 540MB hard drive, a spacious 17-inch monitor, a fast 2MB PCI graphics accelerator, a CD-ROM drive, and a peppy 14.4-kbps fax-modem, all for a reasonable $3224. Rolling into fifth place for budget desktops, Micro Express's MicroFlex-VL/66G DX2-66 tower is amazingly well appointed for its $1749 price—above-average DX2-66 performance, a 15-inch monitor with a 2MB 64-bit VLB graphics accelerator, a large 540MB drive with a 1MB VLB caching controller, and loads of room to grow.

### Some Top Systems Just Got Cheaper

Our top Best Buys? Steady price drops have kept the Dell Dimension XPS P90 in the premier power desktop spot for five months in a row. This well decked out Pentium-90 system with a 15-inch monitor and a huge 1GB hard disk now sells for $3228. For power notebooks, the $5949 Compaq LTE Elite, reviewed last month, holds the peak power mobile spot again. You get the works with the Elite: top performance, a 340MB hard disk, a 9.5-inch active-matrix color screen, and long, long 6.5-hour battery life.

For budget desktops, Micron's 4100PCI Magnum (reviewed in August) becomes the first DX4-100 system to capture a top Best Buy. Noticeably faster than a typical Pentium-60 and loaded with a 420MB hard drive, a CD-ROM drive, and a high-end graphics accelerator, this $2249 PC also nabs a spot on our Power Desktops Top 20. Meanwhile, a $600 price slash makes Compaq's Contura Aero 4/33C Model 170 (reviewed in July) our first-choice budget mobile. For $1799, you get a fast subnote that's surprisingly comfortable to use and has a very readable passive color display, a 170MB hard disk, and great 6.3-hour battery life.

The forecast? As we prepared this review, chip-maker giant Intel announced another round of major price cuts on its DX2-66 and Pentium processors. Furthermore, expect the company's Pentium-100 to replace the Pentium-90 as the top-end chip for desktops, and its soon-to-be-released 3-volt 75-MHz Pentium CPU to become the new high-end processor in notebooks, further depressing prices on the current lineup of systems. Add the competition from rival chip makers such as Cyrix and AMD, and PC buyers can look forward to auspicious conditions for shopping.

*Bryan Hastings is an associate editor for* PC World. *He can be reached on PC World Online (see page 12 for contact information).* PC World *staff members Mike Desmond, John Goddard, Anita Hamilton, Caroline Jones, Owen Linderholm, Melissa Riofrio, and Susan Silvius contributed to this article.*

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**For more information about all products in this article, circle reader service no. 902.**

## Buying Smart: Consumer Tips

**Call tech support before buying.**
**Ask for the toll-free support number, then call and ask some technical questions, gauging responsiveness, knowledge, and courtesy.**

**Buy a bigger monitor for high resolutions.**
**A 15-incher usually provides easy viewing at 800 by 600 and may be comfortable at 1024 by 768—but try before you buy.**

**Back up with a tape drive.**
**Match tape and hard drive capacities. Capacities of optional internal tape drives vary from about 250MB to 850MB. Tape drives sell from $160 to $500 on the street.**

**Use a credit card.**
**Unless you have credit arrangements with the vendor, use a credit card to order all equipment. The credit card company can help mediate disputes between you and the vendor or give you a refund if you don't receive a product you've been charged for.**

# This Month's Contenders

Our look at this month's contenders for the Top 20 Power and Budget Desktops and the Top 20 Mobile PCs. Icons show where systems placed on the Top 20 charts.

## Acma P60

**PROS:** Fast for a Pentium-60, great expandability
**CONS:** Sparse documentation

If you're scouting for a reasonably priced, speedy system with lots of room to grow, check out Acma's P60. This 60-MHz Pentium PC scored better in our tests than the average system of its CPU class and comes with a decent features set—a 420MB hard drive, 8MB of RAM, and 256K of secondary cache—as well as a 15-inch monitor and a 1MB PCI graphics accelerator. Not bad for $2597.

Acma

Expansion options are many and varied in this massive tower. PCMCIA slots are standard fare on mobile computers, but the P60 is one of the few office systems we've seen that has them (a Type II and a Type III). This feature is convenient for notebook owners who own PCMCIA devices and want to move massive amounts of data quickly between the notebook and the desktop using a PCMCIA hard disk. The P60 also has five free internal expansion slots (a mix of ISA and PCI connectors) and seven free drive bays, including two externally accessible bays.

Support policies are typical. A year of free on-site service and a 45-day money-back guarantee are nice extras, though the 10-hour-per-day, weekday-only tech support is on the short side. Also, the manuals that come with this PC are limited.

The Acma P60 has strong performance and plenty of room to grow. Had it cost a bit less, it might have earned a spot on our Budget Desktops Top 20. *Acma Computers, 800/786-6888, 510/623-1212.* **Reader service no. 636**

## AST Ascentia 800N

**PROS:** Nice price for a DX2-50, light, lots of software
**CONS:** Slow for a DX2-50 mobile

Budget-minded mobile users should take a gander at AST's Ascentia 800N. Sure, this $2649 DX2-50 notebook with 4MB of RAM ran our tests noticeably slower than the typical DX2-50-based notebook did. However, its features cover all the basics and then some. Its 3-plus-hour battery life won't have you constantly fumbling for a fresh pack, its 250MB hard drive is removable, and you can take out the floppy if you'd like to reduce the already-low 6.8-pound traveling weight. The 800N's 9.5-inch dual-scan color screen reads nearly as well as its active-matrix counterpart when you look directly at it, and it's supported by a 1MB local bus graphics controller. We also found the Ascentia easy to warm up to—the keyboard is comfortable, and the trackball (conveniently located below the <Space> bar) glides smoothly. A PCMCIA Type III slot, which also takes two Type II cards, covers your expansion needs. AST preloads this machine with a raft of software, including Lotus Organizer and ConnectSoft's E-Mail Connection. AST's support policies meet or exceed our expectations, and the company offers around-the-clock weekday tech support as well as weekend hours.

AST

In short, AST gives a good deal on a lot of notebook. If you don't crave superfast performance, this notebook deserves your attention. Even if you spend $200 extra for 4MB more of RAM (easily installable at home) to add more zip to the Ascentia 800N, you still pay a lot less than you would for a typical DX2-50 notebook. *AST Research, 800/876-4278, 714/727-4141* **Reader service no. 637**

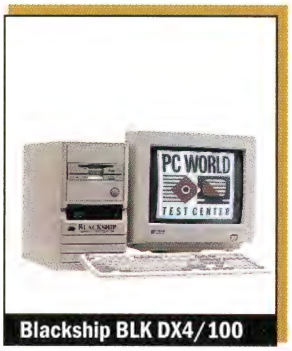
## Blackship BLK DX4/100

PC WORLD TOP 20
15 BUDGET DESKTOP

**PROS:** One of the least expensive DX4-100 PCs available
**CONS:** Generally minimal components

Not all that long ago, a halfway decent DX2-66 PC for $2000 was considered a real bargain. But a DX4-100 computer for $2045?

Believe it. Blackship serves up a rare deal in its BLK DX4/100. True, this minitower's performance scores lag noticeably behind those of a typical system with a DX4-100 CPU, but it's still much faster than the typical DX2-66 PC. And while this system's configuration is mostly average or low-end—8MB of RAM, 256K of secondary cache, and a 1MB graphics adapter paired with a small 14-inch monitor—you get a reasonably roomy 420MB hard drive. You also get a lot of room to grow. The BLK DX4/100's combo floppy drive economizes on space, leaving three drive bays free—all externally accessible—and you get five free 16-bit ISA slots. In addition, two SIMM sockets remain free so you can upgrade RAM without discarding SIMMs. Our chief complaints concern the keyboard and the mouse. The keys were loose and rattly, and some users may find the mouse (also rattly) to be uncomfortably small.



Blackship BLK DX4/100

Blackship offers the customary service and support package, including a one-year warranty, a 30-day money-back guarantee, a year of free on-site service, and a swift 2-day turnaround on factory repairs. Phone support is toll-free 10 hours on weekdays, and the company offers BBS and fax support.

The BLK DX4/100 is a good starter system for the frugal buyer, and you can add components as your wallet allows. With such a low price and flexibility for the future, this system earns its place in our Budget Desktops Top 20. *Blackship Computer Systems, 800/531-7447, 408/432-7500* **Reader service no. 638**

# THE TOP 20

PC WORLD

## POWER DESKTOPS

**1 Dell Dimension XPS P90**
*No. 1 five months running.*

New this month · Up from last month · No change from last month · Down from last month

**BEST BUYS**

| | | Last month | Months on list | Overall rating | Performance rating | Reliability/ service rating | Price | CPU | RAM (MB) | Hard drive (MB) | Bus slots |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Dell Dimension XPS P90 | 1 | 5 | 96 | 93 | 72/79 | $3228 | Pentium-90 | 16 | 1080 | ISA, PCI |
| 2 | Zeos Pantera DX4-100 | 2 | 2 | 93 | 95 | 68/75 | $2990 | DX4-100 | 16 | 530 | ISA, PCI |
| 3 | Quantex QP5/90B-2 | – | 1 | 92 | 96 | 69/77 | $3224 | Pentium-90 | 16 | 540 | ISA, PCI |
| 4 | Zeos Pantera 90 | 4 | 4 | 91 | 102 | 68/75 | $3444 | Pentium-90 | 16 | 530 | ISA, PCI |
| 5 | Micron P90PCI PowerStation | 5 | 4 | 91 | 98 | 69/82 | $3659 | Pentium-90 | 32 | 540 | ISA, PCI |
| 6 | Gateway P5-60 | 9 | 2 | 90 | 80 | 69/72 | $2459 | Pentium-60 | 8 | 540 | ISA, PCI |
| 7 | Dell OptiPlex XM 590 | – | 1 | 90 | 98 | 72/79 | $3779 | Pentium-90 | 16 | 540 | ISA, PCI |
| 8 | Austin P5-66 | 6 | 3 | 90 | 94 | 68/76 | $3248 | Pentium-66 | 16 | 520 | ISA, PCI |
| 9 | Austin P90 | 7 | 2 | 90 | 106 | 68/76 | $4795 | Pentium-90 | 16 | 1060 | ISA, PCI |
| 10 | EPS P-90 Explorer | – | 1 | 89 | 102 | 64/70 | $2995 | Pentium-90 | 16 | 540 | ISA, PCI |
| 11 | ALR Evolution V ST/90 | 10 | 2 | 89 | 99 | 73/74 | $3978 | Pentium-90 | 16 | 540 | ISA, PCI |
| 12 | Polywell Poly 586-66V1 | 11 | 2 | 89 | 93 | 64/70 | $2460 | Pentium-66 | 8 | 420 | ISA, VLB |
| 13 | Netis 566P | – | 1 | 88 | 90 | 64/68 | $2498 | Pentium-66 | 8 | 540 | ISA, PCI |
| 14 | Zeos Pantera 66 | 12 | 6 | 88 | 89 | 68/75 | $3179 | Pentium-66 | 16 | 530 | ISA, PCI |
| 15 | Polywell 586-90VIP | 14 | 4 | 88 | 99 | 64/70 | $3250 | Pentium-90 | 16 | 540 | ISA, PCI |
| 16 | NEC Image 4100es | 17 | 3 | 88 | 88 | 75/72 | $3298 | DX4-100 | 16 | 540 | ISA, VLB |
| 17 | Micron 4100PCI Magnum | 13 | 4 | 88 | 80 | 69/82 | $2249 | DX4-100 | 8 | 420 | ISA, VLB |
| 18 | IBM PC Company ValuePoint P/60D | 18 | 10 | 88 | 80 | 76/74 | $3320 | Pentium-60 | 16 | 420 | ISA, PCI |
| 19 | Gateway P5-90 | 15 | 5 | 87 | 92 | 69/72 | $3830 | Pentium-90 | 16 | 540 | ISA, PCI |
| 20 | Gateway P5-66 | 16 | 6 | 87 | 83 | 69/72 | $3430 | Pentium-66 | 16 | 540 | ISA, PCI |

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**2 Zeos Pantera DX4-100**
*Speediest DX4-100 you can buy.*

**3 Quantex P-90 Pentium**
*Lots of PC for $3224.*

**4 Zeos Pantera 90**
*Fastest Best Buy yet.*

**5 Micron P90PCI PowerStation**
*Peppy PC with 32MB of RAM.*

| Monitor size/ dot pitch | Vendor contact number | Issue reviewed | Fax reprint number [1] | Comments |
|---|---|---|---|---|
| 15"/.28 | 800/289-3355 | July 94 | 3113 | Top-notch mix of power, features, and price is a five-time no. 1. |
| 15"/.28 | 800/554-5220 | Oct 94 | 3140 | Top rated DX4-100 is as fast as many Pentium-90s for a lot less money. |
| 17"/.28 | 800/288-0566 | current | 3152 | Loaded with multimedia features, this system replaces version reviewed last month. |
| 15"/.28 | 800/554-5220 | Aug 94 | 3123 | One of the fastest systems we've tested, at a great price. |
| 15"/.28 | 800/438-3343 | Aug 94 | 3124 | Pentium-90 with gobs of RAM holds on to Best Buy status. |
| 15"/.28 | 800/846-2000 | Oct 94 | 3144 | Gateway Pentium also on the Budget Top 20. Moves up thanks to improved software bundle. |
| 14"/.28 | 800/613-3355 | current | 3162 | Sibling of no. 1 power system but quicker and pricier. |
| 15"/.28 | 800/752-1577 | Sept 94 | 3132 | Pentium-66 is faster than several 90s and full of features. |
| 17"/.28 | 800/752-1577 | Oct 94 | 3142 | Fastest system on Power Top 20, with extras like a 17-inch monitor. |
| 14"/.28 | 800/447-0921 | current | 3153 | Fast Pentium-90 is also cheapest 90 on Top 20. |
| 15"/.28 | 800/444-4257 | Oct 94 | 3145 | Speedy Pentium-90 with standard desktop features. |
| 15"/.28 | 800/999-1278 | Oct 94 | 3146 | Quick, basic. Also on Budget Top 20. |
| 15"/.28 | 800/577-7526 | current | 3154 | Basic Pentium-66 at a great price. It's also on the Budget Top 20. |
| 15"/.28 | 800/554-5220 | June 94 | 3091 | Standard Pentium-66 comes with good service. |
| 15"/.28 | 800/999-1278 | Aug 94 | 3126 | Quick, with good desktop configuration. |
| 15"/.28 | 800/632-4636 | Sept 94 | 3133 | Fast DX4-100, expensive despite big price cut that moves it up list. |
| 14"/.28 | 800/438-3343 | Aug 94 | 3125 | Lowest-cost Power Top 20 system. Also Budget no. 1. |
| 15"/.28 | 800/772-2227 | Jan 94 | 3041 | IBM quality, service, and reliability meet in basic Pentium-60. On Top 20 for ten months. |
| 17"/.26 | 800/846-2000 | July 94 | 3114 | Powerful graphics workstation with big 17-inch monitor. |
| 17"/.26 | 800/846-2000 | June 94 | 3093 | Cheaper but slower version of Pentium-90 just above. |

and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95).
Touch-tone phone required. Charges will appear on your telephone bill.

# Blackship Pentium 90 VLB/PCI

**PROS:** Exceptionally cheap for a Pentium-90, VL bus and PCI expansion slots
**CONS:** Exceptionally slow for a Pentium-90, no free SIMM sockets

Blackship's $2995 tower PC is one of the least expensive Pentium-90 systems available, and you get a lot with it, including a 540MB hard drive, a 2MB PCI graphics controller, and a 15-inch monitor. Furthermore, the Pentium 90 VLB/PCI unit is quite expandable. It's one of the few systems we've seen with both VLB and PCI local bus slots. You get two free ISA slots, one free slot for a PCI card, one for VL bus, and another that accepts a PCI or an ISA card. Four drive bays are free.

Blackship Pentium 90

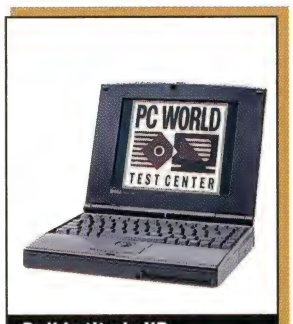
There are a few catches. Performance is considerably slower than we'd expect from a 90-MHz Pentium PC with 512K of secondary cache and 16MB of RAM—the Pentium 90 VLB/PCI doesn't even keep up with the average Pentium-66 PC. Also, all SIMM sockets are full. While 16MB is plenty to start with, you must pull existing RAM to add more, which you'd want in order to run high-powered operating systems such as Windows NT and UNIX. Finally, some may find the keyboard action to be a little on the mushy side. Blackship's support policies are mostly par for the course, though free on-site service for the first year is a nice plus. While the Pentium 90 VLB/PCI doesn't make our Top 20, it's still a lot of system for the money. *Blackship Computer Systems, 800/531-7447, 408/432-7500* **Reader service no. 639**

# Dell Latitude XP

PC WORLD TOP 20 **8** POWER MOBILE PC

**PROS:** Phenomenal battery life, nice software bundle
**CONS:** Slow in our DOS application tests

If it's super-long battery life you crave in a notebook, Dell's Latitude XP is for you. With nearly 7 hours of computing on a charge, this DX2-50 PC outlasted all the other mobiles we've ever had on the bench. Other features that commend this 7.2-pounder include a 9.5-inch active-matrix color screen with a 1MB local bus video controller and a roomy, removable 390MB hard drive that comes with CommWorks preinstalled. A PCMCIA slot lets you add a Type II or Type III accessory. The keyboard and internal pointing device are both comfortable to use. This system also accommodates an optional port replicator ($199), a device that clips onto the back of the notebook, providing ethernet and SCSI connectors and serial and parallel ports. To top it all off, the Latitude XP is backed by Dell's excellent support, which includes a one-year limited warranty and unlimited 24-hour-per-day support.



Dell Latitude XP

The Latitude XP has much going for it, and at $4299, it's priced about right. Performance results for the Latitude XP, which is equipped with 8MB of RAM, are mixed. It outscored the typical DX2-50 mobile in all four Windows test applications but fared poorly overall in the DOS application tests. Even so, this great little power machine has enough going for it to qualify for our Mobile Top 20. If you stick to Windows applications and need a high-class system with a battery that keeps going and going and going, check out the Latitude XP. *Dell Computer, 800/613-3355, 512/338-4400* **Reader service no. 640**

# Dell OptiPlex XM 590

PC WORLD TOP 20 **7** POWER DESKTOP

**PROS:** Good Pentium-90 performance, excellent support
**CONS:** None

Dell's latest desktop comes with a powerful lineup of silicon: a 90-MHz Pentium processor, 16MB of RAM, and 256K of secondary cache. Performance results attest to this horsepower—in our test suite, the XM 590 nosed past the typical Pentium-90 competitor. That's pretty good for a system that costs only $3779. That price also buys you a hefty 540MB hard drive and a fast 2MB PCI graphics controller. Dell trimmed costs with the monitor. Although energy efficient, it's small—only 14 inches. An extra $150 gets you a 15-inch model, which can take better advantage of the 1280 by 1024 resolution that the graphics controller offers.

Dell OptiPlex XM 590

Pop the case off this sturdy compact, and you'll find ample expansion space and a clean layout. Five 16-bit ISA connectors and two PCI connectors are free, though if both PCI slots are filled, you can add only three ISA cards. The combo floppy disk drive provides both common formats, leaving the system with two drive bays free.

Dell backs this OptiPlex with industry standard policies, highlighted by a three-year warranty and daily 24-hour toll-free tech support. The only thing missing is a firm turnaround policy on factory repairs. Turnaround may vary from three days to over a week, depending on the nature of the problem. Dell's manuals and preinstalled Q&A and Support directory are easy to read and contain a wealth of illustrated problem-solving information.

We have no qualms recommending this powerful PC. The OptiPlex XM 590's high performance, quality components, and solid support place it high on our Power Desktops Top 20. *Dell Computer, 800/613-3355, 512/338-4400* **Reader service no. 641**

# EPS P-90 Explorer

PC WORLD TOP 20 **10** POWER DESKTOP

**PROS:** Blazing performance, super cheap for a Pentium-90
**CONS:** Expandability slightly limited

Serious desktop power has become seriously affordable. The EPS P-90 Explorer, which packs a 90-MHz Pentium CPU, 16MB of RAM, and a large 512K of secondary cache, delivers some of the best performance we've seen. Attractively

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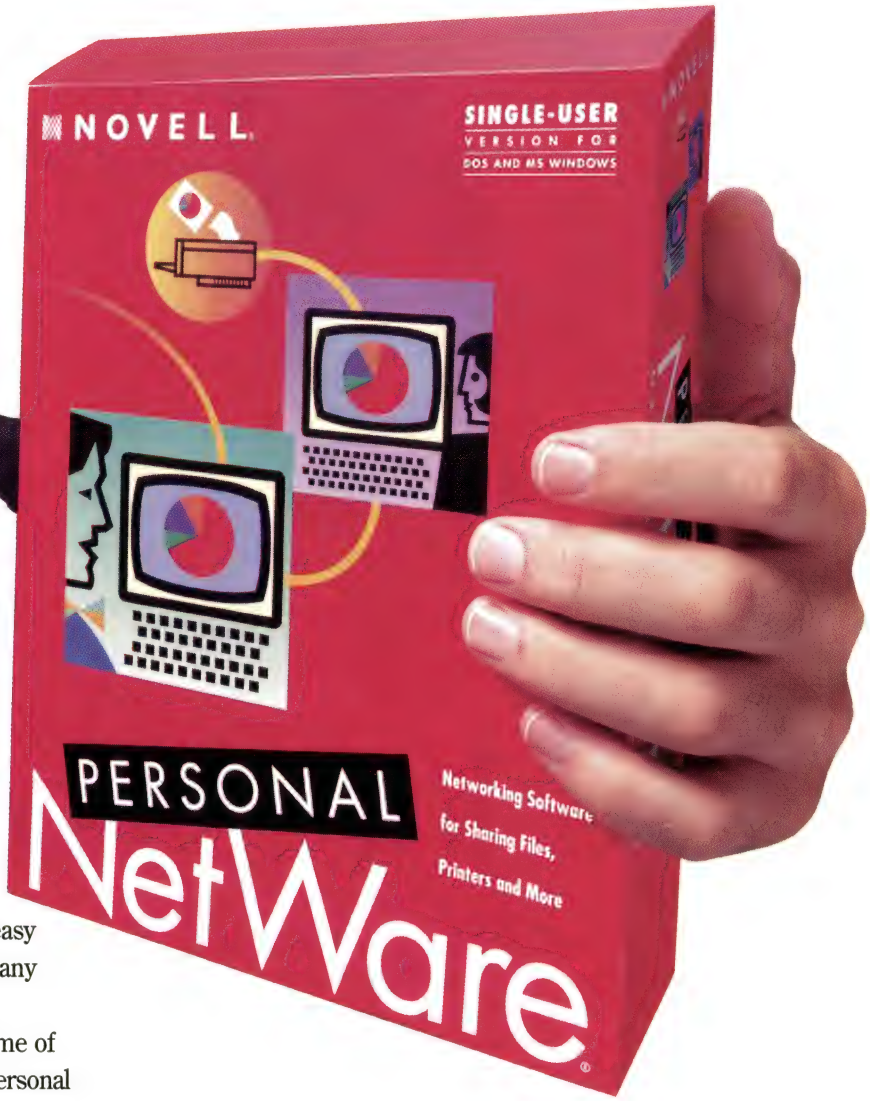


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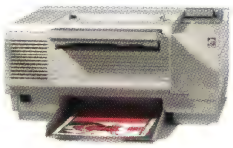

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EPS

priced at $2995, this system will appeal to users who need top power while keeping an eye on the bottom line.

The P-90 Explorer's 102 performance rating puts it among the fastest PCs that we've tested. The 540MB hard drive is not only spacious, its Enhanced-IDE technology may help explain the scorching Paradox numbers. A CD-ROM drive lets this system run some of the latest applications and titles, while a 2MB Diamond Stealth 64 controller open the door to stunning graphics.

The good news keeps coming. The keyboard is refreshingly solid and provides good tactile feedback, and the Microsoft Mouse is superior to the low-quality rodents that accompany too many PCs. We also like the well-organized manuals, and EPS service and support policies are better than we usually find from a relatively small and unknown company. You get a three-year parts warranty (one year on labor) and a 60-day money-back guarantee. Tech support is available 12 hours each weekday, 6 hours on Saturdays.

The P-90 Explorer falls short only in a couple of areas. We had hoped for a monitor larger than the supplied 14-incher, and expandability is a bit limited. Still, it's not bad for a compact. One PCI and two ISA slots are open for upgrades, as well as a slot that can take either a PCI or ISA card, along with three free drive bays.

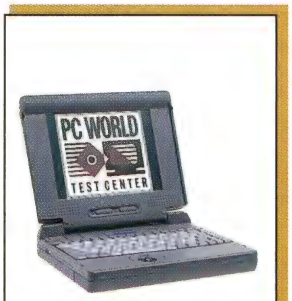
In brief, the P-90 Explorer has redefined the low-cost Pentium-90 system and easily lands on our Power Desktops Top 20. *EPS Technologies, 800/447-0921, 605/966-5586* **Reader service no. 642**

# FutureTech FutureMate 7500

PC WORLD TOP 20 **7** POWER MOBILE PC

**PROS:** Fastest notebook yet, affordable, large hard disk, built-in audio capability
**CONS:** Heavy, trackball and screen controls difficult to use

Hold on to your briefcase! The FutureMate 7500 notebook, with a DX4-100 processor and 8MB of RAM, blew through our performance tests faster than any other notebook we've seen, and it comes with a respectable feature set. Even better, this tiny tiger is quite affordable at $2912. Small wonder this FutureMate placed solidly in the power section of the Mobile PCs Top 20.



FutureTech FutureMate

The FutureMate 7500 is not without rough edges. This 8.4-pound note is a bit portly. We found the screen's brightness and contrast controls difficult to adjust. The trackball's loose ride hampered navigation, and its buttons may be stiff for some tastes. Still, our experience with the system is generally positive. The keys have a soft click, crisp response, and deep travel, and the 9.5-inch dual-scan color screen is bright and evenly lit. For storage, there's a removable 340MB hard drive. A stacked PCMCIA slot can handle one Type II and one Type III card at once, or one larger PCMCIA device, often unofficially called a Type IV card. Battery life isn't bad for such a powerhouse: 3.5 hours. The FutureMate 7500 also includes built-in audio.

FutureTech's service policies are generally standard, with one highlight: The company claims a one-day turnaround on repairs. Toll-free tech support is available 11 hours on weekdays.

The FutureMate offers unprecedented speed, a low price, and a solid set of features—a combination sure to please the mobile power user, and more than enough to place this system on our Mobile Top 20 chart. *FutureTech Systems, 800/275-4414, 201/488-4414* **Reader service no. 643**

# FutureTech System 4414A

PC WORLD TOP 20 **16** BUDGET DESKTOP

**PROS:** Great price for a multimedia PC
**CONS:** Slow for a DX4-100

At $1999, the System 4414A is the lowest-cost DX4-100 we've seen, and it comes with multimedia and a fax-modem to boot. While slow for a system of its CPU class—our tests put it halfway between a typical DX2-66 and a typical DX4-100 PC—the 4414A still offers enough punch for the money to battle its way onto our Budget Desktops Top 20.

FutureTech System 4414A

Yes, there are compromises. The 14-inch monitor hardly does justice to the system's 2MB VL bus graphics controller. Also, the fax-modem is lowest-end. Although it sends faxes at 9600 bps, it receives them at only 4800 bps and exchanges data at 2400 bps. But we were surprised at what you *do* get for the money: Along with the usual 8MB of RAM and 256K of secondary cache, there's a CD-ROM drive, a sound card, speakers, and a spacious 410MB hard drive, plus multimedia and communications programs.

Expandability is fair—three ISA slots and three drive bays are free. The System 4414A also has power management. FutureTech's support policies include a 15-month warranty with the first year of on-site service available for $49. Telephone support lines are open 11 hours a day on weekdays, and the company says it averages a one-day turnaround on repairs.

Even with the current cutthroat competition, the System 4414A is an unusual value. If you opt for a larger monitor and a 14.4-kbps fax-modem, you can get a well-rounded multimedia system with fast fax and data comm and still pay a true budget price. *FutureTech Systems, 800/275-4414, 201/488-4414* **Reader service no. 644**

# Micro Express MicroFlex-VL/66G

PC WORLD TOP 20 **5** BUDGET DESKTOP

**PROS:** Fast, well equipped, low cost, good expandability **CONS:** None

If you think a DX2-66 desktop under $2000 has to be slow and bare-bones, let the MicroFlex-VL/66G disabuse you of that notion. This tower, which comes with 8MB of RAM, performed significantly better than the typical DX2-66, it's loaded with quality components, and it sells for only $1749. The

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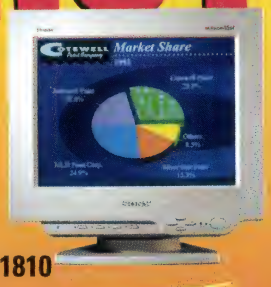
11810

16153

16820

14028

7369

| | |
|---|---|
| 16525 COREL Flow | $69.95 |
| 11810 SONY 15SF Color Display | $499.95 |
| 16153 CANON Bubble Jet 100 | $199.95 |
| 16820 IOMEGA Transportable 230 | $499.95 |
| 14028 COACTIVE Connector Starter Kit | $199.00 |
| 7369 TARGUS Notepac Carry Case | $35.95 |

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| 14101 | ATI Graphics Xpression | $219.95 |
| 7549 | C. Labs SoundBlaster AWE32 | 289.95 |
| 3320 | C. Labs Discover 16 Internal | 329.95 |
| 16195 | MagInnovision DX15F Monitor | 409.00 |
| 16200 | Matrox MGA ULTIMA | 359.95 |
| 13121 | VideoLabs Flexcam | 499.95 |
| 2592 | Videologic 928-1MB | 299.95 |
| 3069 | Turtle Systems MONTEREY | 369.95 |

## BUSINESS

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|---|---|---|
| 7547 | Adobe Type Manager-Win 3.0 | $39.95 |
| 16536 | Ami Pro 3.0 (after $30 mfr rebate) | 69.95 |
| 14734 | Best!Ware M.Y.O.B. Acct. 4.0-Win | 54.95 |
| 11907 | Borland dBASE5 for Windows | 349.95 |
| 16313 | Borland Paradox Windows 5.0 | 339.95 |
| 6788 | Borland Quattro Pro Windows 5.0 | 44.95 |
| 5785 | CheckMark Payroll for Windows | 79.95 |
| 5257 | Claris FileMaker Pro for Windows | 119.95 |
| 5596 | Intuit Quicken for Windows | 42.95 |
| 2483 | MacToolkit Cork Board | 104.95 |
| 3446 | Meca Managing Your Money-Win | 34.95 |
| 6172 | MS Windows Workgroups Add-on | 47.95 |
| 13987 | Nolo WillMaker for Windows | 36.95 |
| 16088 | Peachtree Accounting Vers. 3 | 119.95 |
| 15847 | Powersoft PowerBuilder Desktop | 229.95 |
| 16651 | Shapeware Visio-Win v3.0 | 129.95 |
| 10901 | Softkey A.H. Talking Dictionary CD | 38.95 |
| 7766 | Timeslips Release Five-Win | 189.95 |
| 15868 | WordPerfect Works-Windows | 74.95 |
| 15866 | WordPerfect InfoCentral | 99.95 |

## GRAPHICS

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| 13046 | Abracadata Design Home-Arch | $29.95 |
| 16661 | Adobe Photoshop-Win 3.0 | 569.95 |
| 15573 | Altamira Composer | 529.95 |
| 8675 | Altsys Fontographer-Windows | 259.95 |
| 15884 | Andover Adv. Morphology CD | 19.95 |
| 11895 | CorelDRAW 4.0 CD-ROM | 269.95 |
| 8498 | CorelDRAW 5.0 CD-ROM | 459.95 |
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| 13956 | Kai's Power Tools-Windows | 119.95 |
| 16427 | Macromedia Director-Windows | 859.95 |
| 7307 | Micrografx Designer 4.0 | 469.95 |
| 15742 | Micrografx Win. Draw! Value Pak | 48.95 |
| 6992 | North Coast PhotoMorph-Win | 89.95 |
| 6153 | Photodisc ClipPix | 99.95 |
| 10795 | QuarkXPress-Windows | 589.95 |
| 16619 | RayDream addDepth-Windows | 109.95 |
| 4680 | T/Maker Incredible ImagePak-Win | 65.95 |

## RECREATION

| | | |
|---|---|---|
| 16779 | Cambrix Everywhere USA CD-ROM | $44.95 |
| 16830 | Delorme Map 'n Go CD-ROM | 49.95 |
| 15140 | Lucas Arts Rebel Assault CD-ROM | 49.95 |
| 14403 | Maxis SimCity 2000 | 42.95 |
| 15718 | Soft Marktg. BodyWorks CD-ROM | 39.95 |
| 16783 | Warner Aegis Guardian of Fleet | 69.95 |

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|---|---|---|
| 14413 | BookMaker ClickBook | $44.95 |
| 6508 | Dataviz Conversions Plus-Win | 89.95 |
| 16946 | Qualitas 386Max/SideKick Bundle | 64.95 |

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| 10077 TEXAS INSTRUMENTS TravelMate 4000M SX2/25 Mono | $1879 |
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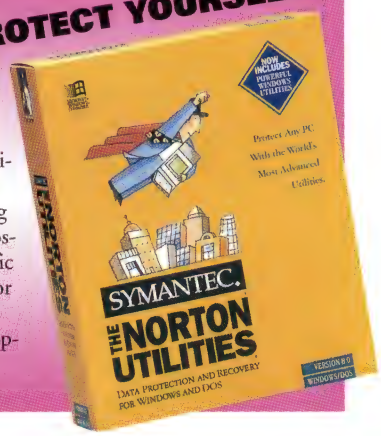


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## INPUT/OUTPUT

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|---|---|---|
| 16574 | Canon Color Bubble Jet 4000 | $529.95 |
| 16084 | Epson Color Stylus | 599.95 |
| 16890 | HP DeskJet 320 | 319.95 |
| 16608 | Inset HiJaak Graphics Suite | 99.95 |
| 7114 | Inset OOGler | 19.95 |
| 6882 | LaserTools PrintCache | 47.95 |
| 11014 | MDS 10T/BNC EtherNet Card | 49.95 |
| 16443 | Okidata OL410E/PS | 999.95 |

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|---|---|---|
| 16852 | Iomega 230MB Cartridge | $99.95 |
| 16851 | Iomega 230MB Cartridge (5-Pack) | 479.95 |
| 14405 | MDS Chinon 535 CD-ROM Drive | 339.95 |
| 16215 | MDS 270MB Hard Drive | 249.95 |
| 12534 | MDS 270MB SyQuest Drive | 499.95 |
| 3298 | Sony 3½" HD (10-pack) | 10.95 |
| 13369 | Sony QD2120 (3-pack) | 41.95 |
| 11856 | Sony QD2120QIC80 (2-pack) | 31.95 |

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|---|---|---|
| 16558 | APC Back-UPS 200 | $99.95 |
| 16559 | APC Back-UPS 280 | 109.95 |
| 14018 | Kensington NoteBook Traveler Tote | 35.95 |
| 11207 | Targus Leather Notebook Case | 95.00 |

## NETWORKING

| | | |
|---|---|---|
| 16920 | Allied Telesis AT-1500T+ E-net | $79.95 |
| 16724 | Artisoft CorStream (5-User) | 629.95 |
| 4436 | Artisoft LANtastic 6 (1-User) | 82.00 |
| 15595 | Artisoft Simply LANTastic Starter | 169.00 |
| 11368 | Asanté Hub1012 w/SNMP Option | 999.00 |
| 14028 | Coactive Connector Starter Kit | 199.00 |
| 16947 | Eagle EH1200 12 Port Hub | 219.95 |
| 11476 | Farallon EtherWave AUI Trans. | 109.00 |
| 12527 | Farallon EtherWave PCMCIA Adpt | 285.00 |
| 12058 | Novell NetWare 4.0 (10-User) | 1,999.00 |
| 14837 | Shiva NetModem/E | 1,479.00 |
| 2519 | Xircom PCMCIA 10B-T Adapter | 239.00 |

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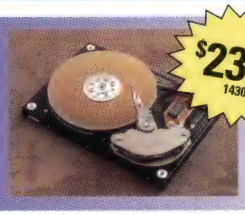

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|---|---|---|
| 16413 | Lotus 1•2•3 -Windows 5.0 *(Version)* | $99.95 |
| 13743 | Microsoft Excel 5.0-Windows *(Version)* | $89.95 |
| 7986 | Microsoft Office Pro 4.3-Win. *(Competitive and Version)* | $375.95 |
| 5532 | Microsoft Access 2.0-Win. *(Competitive and Version)* | $119.95 |
| 9759 | Harvard Graphics-Windows *(Competitive and Version)* | $99.95 |
| 1169 | Symantec Act!-Windows *(Version)* | $69.95 |

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# THE TOP 20

PC WORLD

## BUDGET DESKTOPS

**1 Micron 4100PCI Magnum**
*First no. 1 DX4-100 PC.*

New this month · Up from last month · No change from last month · Down from last month

**BEST BUYS**

| | | Last month | Months on list | Overall rating | Performance rating | Reliability/ service rating | Price | CPU | RAM (MB) | Hard drive (MB) | Bus slots |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Micron 4100PCI Magnum | 2 | 2 | 87 | 80 | 69/82 | $2249 | DX4-100 | 8 | 420 | ISA, VLB |
| 2 | Diamond DT 486-66 | 1 | 3 | 87 | 64 | 65/66 | $1650 | 486DX2-66 | 8 | 270 | ISA, VLB |
| 3 | Gateway P4D-66 | 10 | 6 | 87 | 60 | 69/72 | $2199 | 486DX2-66 | 8 | 730 | ISA, PCI |
| 4 | Gateway P5-60 | 3 | 2 | 86 | 80 | 69/72 | $2459 | Pentium-60 | 8 | 540 | ISA, PCI |
| 5 | Micro Express MicroFlex-VL/66G | – | 1 | 86 | 62 | 66/66 | $1749 | 486DX2-66 | 8 | 540 | ISA, VLB |
| 6 | CompuAdd C466D | 5 | 7 | 86 | 56 | 70/72 | $2000 | 486DX2-66 | 8 | 430 | ISA, VLB |
| 7 | MIS M466T | 4 | 10 | 85 | 59 | 78/84 | $1920 | 486DX2-66 | 8 | 240 | ISA, VLB |
| 8 | Polywell Poly 486-40DX | 6 | 6 | 85 | 51 | 64/70 | $1598 | AMD 486DX-40 | 8 | 420 | ISA, VLB |
| 9 | MIS M466 PCI | 12 | 5 | 85 | 46 | 78/84 | $1995 | 486DX2-66 | 8 | 240 | ISA, PCI |
| 10 | Austin Power System 60 | 7 | 4 | 84 | 64 | 68/76 | $2248 | Pentium-60 | 8 | 420 | ISA, PCI |
| 11 | AST Bravo MT 466d | 8 | 10 | 84 | 53 | 74/72 | $1639 | 486DX2-66 | 8 | 170 | ISA |
| 12 | USA Flex Pentium 60MHz System | – | 1 | 84 | 77 | 68/71 | $2399 | Pentium-60 | 8 | 430 | ISA, PCI |
| 13 | Quantex Q486DX2/66MM-4 | 16 | 6 | 84 | 55 | 69/77 | $2084 | 486DX2-66 | 8 | 540 | ISA, VLB |
| 14 | Polywell Poly 586-66V1 | 11 | 2 | 84 | 93 | 64/70 | $2460 | Pentium-66 | 8 | 420 | ISA, VLB |
| 15 | Blackship BLK DX4/100 | – | 1 | 84 | 69 | 69/67 | $2045 | DX4-100 | 8 | 420 | ISA, VLB |
| 16 | FutureTech System 4414A | – | 1 | 84 | 61 | 64/68 | $1999 | DX4-100 | 8 | 410 | ISA, VLB |
| 17 | Dell Dimension 450SV | 53 | 4 | 84 | 41 | 72/79 | $1499 | 486SX2-50 | 8 | 340 | ISA, VLB |
| 18 | NEC PowerMate 4100M | 9 | 2 | 84 | 75 | 75/72 | $2415 | DX4-100 | 8 | 420 | ISA, VLB |
| 19 | Netis 566P | – | 1 | 84 | 90 | 64/68 | $2498 | Pentium-66 | 8 | 540 | ISA, PCI |
| 20 | Ares PCI/VESA | 21 | 1 | 84 | 52 | 70/69 | $2195 | 486DX2-66 | 8 | 420 | ISA, PCI |

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to three individual systems' capsule reviews or one capsule plus features table and test reports ($4.95); a complete month's review ($9.95 each; December 3012, February 3002, March 3003, May 3005, June 3006, July 3007, August 3008, September

**2** **Diamond DT 486-66**
*Loaded DX2-66 for $1650.*

**3** **Gateway P4D-66**
*Low cost, big hard disk.*

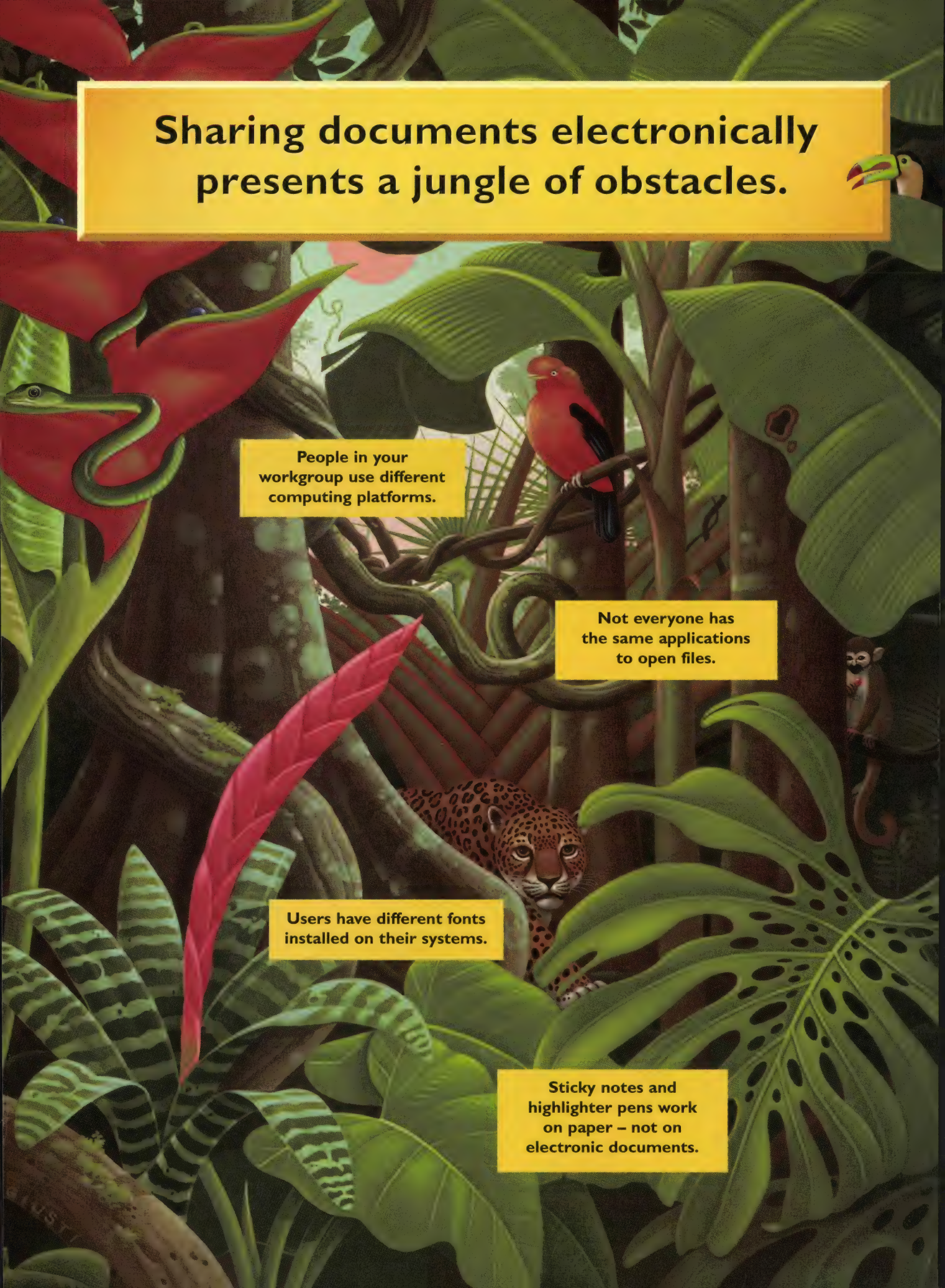
**4** **Gateway P5-60**
*Great budget Pentium-60.*

**5** **Micro Express MicroFlex-VL/66G** *High-value DX2-66.*

| Monitor size/ dot pitch | Vendor contact number | Issue reviewed | Fax reprint number [1] | Comments |
|---|---|---|---|---|
| 14"/.28 | 800/438-3343 | Aug 94 | 3125 | Fastest budget Best Buy is the first DX4-100 to capture the no. 1 spot. |
| 14"/.28 | 800/989-7253 | Sept 94 | 3138 | Very slight service drop takes fast DX2-66 down to no. 2 position. |
| 15"/.28 | 800/846-2000 | June 94 | 3096 | Huge increase in hard drive size along with a price cut moves Gateway DX2-66 back to Best Buy ranks. |
| 15"/.28 | 800/846-2000 | Oct 94 | 3144 | Highest-rated budget Pentium also just misses power Best Buy. |
| 15"/.28 | 800/989-9900 | current | 3155 | Low-cost DX2-66 with large hard drive squeaks into Best Buy slot. |
| 15"/.28 | 800/627-1961 | May 95 | 3103 | Price cut not quite enough for this well-rounded DX2-66 to hold on to Best Buy spot. |
| 14"/.28 | 800/733-9188 | Dec 93 | 3052 | Good service helps out this 486DX2-66 with a smallish hard drive. |
| 14"/.29 | 800/999-1278 | June 94 | 3104 | Low-priced AMD 486DX-40 manages respectable performance. |
| 14"/.28 | 800/733-9188 | July 94 | 3149 | Price cut moves this sluggish system with good service up the Top 20. |
| 15"/.28 | 800/752-1577 | Mar 94 | 3062 | Cheapest Pentium system in the review, but slow for its CPU class. |
| 15"/.28 | 800/876-4278 | Feb 94 | 3110 | Low price helps out an otherwise ordinary and rather lightweight system. |
| 15"/.28 | 800/872-3539 | current | 3156 | PCI-based Pentium-60 with a standard range of features. |
| 15"/.28 | 800/288-0566 | June 94 | 3107 | Loaded multimedia DX2-66 has good service record. |
| 15"/.28 | 800/999-1278 | Oct 94 | 3146 | Fastest budget system is also first Pentium-66 to make the list. |
| 14"/.28 | 800/531-7447 | current | 3157 | Basic DX4-100 with good speed. |
| 14"/.28 | 800/275-4414 | current | 3158 | Cheap multimedia DX4-100 with modem has ordinary performance, reliability, and service. |
| 14"/.28 | 800/289-3355 | Aug 94 | 3159 | Big price cut moves this cheapest and slowest Budget Top 20 system onto list. |
| 15"/.28 | 800/632-4636 | Oct 94 | 3148 | Good desktop with quality NEC components. |
| 15"/.28 | 800/577-7526 | current | 3160 | Fast Pentium-66-based system hurt by ordinary reliability and service. No. 13 on Power list. |
| 15"/.28 | 800/322-3200 | Oct 94 | 3161 | Standard, slightly expensive DX2-66 edges onto Top 20. |

3009, October 3010, November 3011); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

# Sharing documents electronically presents a jungle of obstacles.



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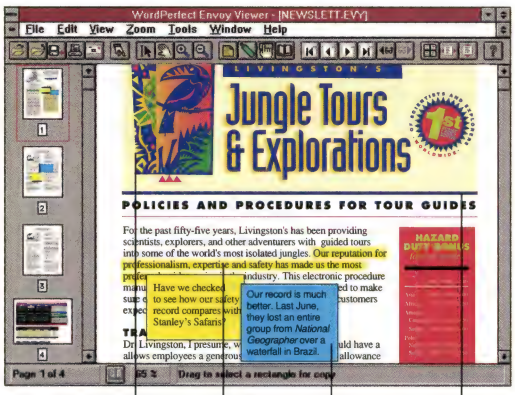


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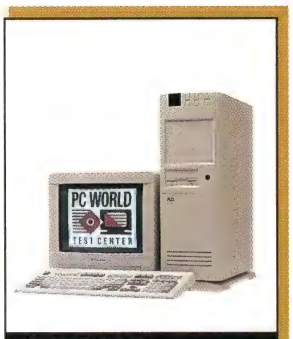
result? This MicroFlex soared to the fifth rung in our budget desktop category.



Micro Express

What enabled the MicroFlex-VL/66G to fare so well? While its 256K of secondary cache is nothing unusual, the 2MB 64-bit VLB graphics accelerator is a speedster and drives a 15-inch monitor, furnishing crisp 1024 by 768 images. The capacious 540MB drive comes with a 1MB VL bus caching controller, which may help explain this system's exceptional performance in the disk-intensive Paradox tests.

Tower usually means lots of expandability, and the MicroFlex-VL/66G is no exception. You get four free externally accessible drive bays and two free internals. The interior gives you plenty of space to add peripherals in four free ISA slots and one free VL bus slot. (One of the unoccupied ISA slots is 8-bit only.) The MicroFlex-VL/66G has an interesting mix of 30- and 72-bit SIMM sockets; if you need to upgrade memory, just snap a 4MB, 8MB, or 16MB module into the one free 72-pin socket. The unit's power-saving features, located in system setup, put the hard disk and monitor to sleep after a user-specified period of inactivity.

Micro Express support policies don't match those of the top-tier vendors, but they are quite good. You get round-the-clock phone support that's toll free during business hours. At night and on weekends, you leave a message on a toll number, and a technician returns your call. Micro Express's two-year warranty comes with on-site service for $50 per year.

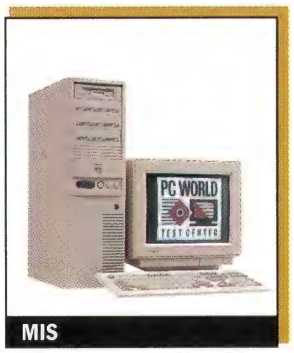
The MicroFlex-VL/66G stands out for its terrific combination of low price, strong performance, and impressive expandability, and it richly deserves its Best Buy rating. *Micro Express, 800/989-9900, 714/852-1400* **Reader service no. 645**

# MIS M54PI System

**PROS:** Inexpensive for a Pentium-90, excellent expandability

**CONS:** Very slow for its CPU class

When MIS's Pentium-90 PC came through our door with a $3150 price, a roomy tower chassis, and big 540MB hard disk, we were intrigued. Alas, MIS M54PI performance failed to meet our expectations—with 8MB of RAM and 256K of secondary cache, the system barely bested a typical 60-MHz Pentium. However, its free drive bays are plentiful, and prospects for adding cards are good, with four free ISA slots and a single shared space for either a PCI or an ISA card. The M54PI's keyboard and mouse are of excellent quality, and its 15-inch monitor is a pleasant surprise on a budget system. However, the 64-bit graphics board, which requires 2MB of RAM for optimum performance, comes with just 1MB. Support policies are typical, though the 45-day money-back guarantee is longer than most. Tech support is available 10 hours a day on weekdays.



MIS

The upshot? This affordable Pentium-90 has great expandability, but for the price you can get a similar configuration and better performance. *MIS Computer, 800/733-9188, 510/226-9188* **Reader service no. 646**

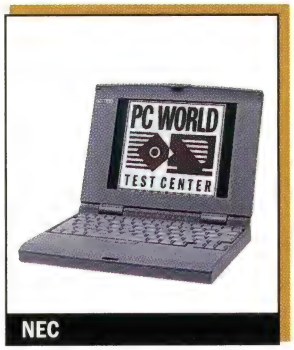
# NEC Versa S/50

PC WORLD TOP 20 5 POWER MOBILE PC

**PROS:** Strong performance, very long battery life, excellent service and support

**CONS:** Keys feel insubstantial

We don't know whether to call it a full-bodied subnote or a slender notebook, but we do know that NEC fielded a sharp-looking Mobile Top 20 PC this month. This system's $3899 price is about what you'd expect to pay for a high-end DX2-50 mobile, but look at what you get: The Versa S/50, with a hefty 12MB of RAM, performed nearly as well as a typical DX4-75 notebook in our tests yet ran for 5.5 hours on a single battery charge. This is astounding battery life for such a speedy mobile with a 9.5-inch active-matrix color screen. You also receive a removable 260MB hard drive, 1MB local bus video, and a PCMCIA Type III slot. This Versa has no internal floppy drive, but even with its external floppy and AC adapter, the system weighs less than 7 pounds.



NEC

Some folks may not warm up to the Versa's keyboard—the keys feel a bit flimsy; they are, however, sensibly laid out. The pointing device, similar to the IBM ThinkPoint, looks like an eraser head nestled between the G, H, and B keys. You have to press it firmly to move the pointer quickly across the screen, but maneuvering the pointer is easy once you get the hang of it.

NEC's support package includes a three-year warranty with a year of one-day turnaround on factory repairs. Toll-free tech support is available 24 hours a day for the first year (11.5 hours a day thereafter), but you will quickly find answers to many of your questions in NEC's excellent manual and online documentation.

Overall, the Versa S/50 is such a great value that it earns a spot in the power section of our Mobile Top 20. This unit has all you need to travel in style, and the price is nice. *NEC Technologies, 800/284-4484, 508/264-8000* **Reader service no. 647**

# Netis N566P

PC WORLD TOP 20 13 POWER DESKTOP

19 BUDGET DESKTOP

**PROS:** Great performance for the price, big hard disk

**CONS:** None

Netis has a knack for combining uncommon speed, low price, and a well-rounded feature set in an office computer. Its latest PC, the $2498 N566P, posted about the fastest scores we've seen for a budget system, second only to the Polywell 586-66V1 reviewed last month. The N566P is a tad quicker than the typical Pentium-66, surprisingly agile for a system with only 8MB of RAM (the

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| | ViewSonic 17 | ViewSonic 17G | ViewSonic 17E |
|---|---|---|---|
| Screen Size | 17" | 17" | 17" |
| Dot Pitch | 0.27mm | 0.28mm | 0.28mm |
| Max. Resolution | 1600 x 1280 | 1280 x 1024 | 1280 x 1024 |
| Max. Refresh | 160Hz | 160Hz | 90Hz |
| Horiz. Frequency | 30-82KHz | 30-64KHz | 30-64KHz |
| ViewMatch™ Color Control | Yes | Yes | Yes* |
| OnView™ Controls | Yes | Yes | No |
| Flat Square Screen | Yes | Yes | Yes |

* Color temperature switching from 6550°K to 9300°K.

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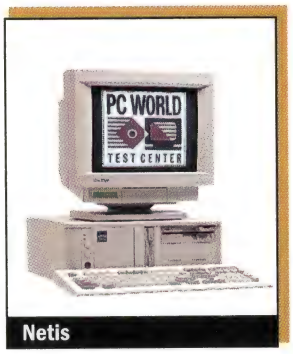
**Circle 224 on reader service card**

typical Pentium-66 comes with twice that amount of memory). The N566P's 256K of secondary cache and hefty 540MB SCSI hard drive probably didn't hurt performance any. We were also pleased by the graphics setup: The 15-inch monitor has a control panel for precision image tuning, and the 2MB 64-bit PCI graphics accelerator delivers flicker-free displays up to 1280 by 1024 resolution. A handy extra is the ATI Graphics Expression utility, which lets you hot-key to the optimum combination of resolution and color depth for the application you're working in rather than having to restart Windows. And monitor sleep modes allow you to do your bit for the environment while saving a little of your own green on electricity bills.



Netis

Expandability? This compact supplies four free drive bays, in addition to three free ISA expansion slots and an extra slot for either a PCI or an ISA card. Netis's support package backs up its system with the basics, including a two-day turnaround policy for factory repairs. Tech support is available 10 hours a day on weekdays, 6 hours on Saturdays.

In short, Netis packs a great deal into its compact—searing performance for a system this inexpensive, and lots of high-end components—achieving a place on both our Budget and Power Desktops Top 20 charts. *Netis Technology, 800/577-7526, 408/263-0368.* **Reader service no. 648**

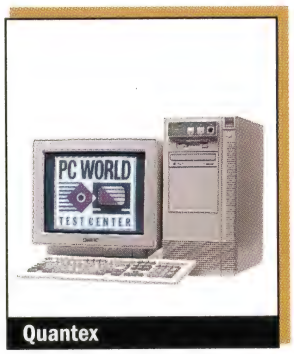
## Quantex QP5/90B-2

PC WORLD TOP 20 3 POWER DESKTOP

**PROS:** Low price, scorching performance, large monitor, lots of drive bays
**CONS:** Cumbersome documentation

If you haven't heard of Quantex, listen up: The company's latest offering is among the most impressive systems we've ever seen for the price. Not only is the $3224 QP5/90B-2 exceptionally inexpensive for a Pentium-90, it's packed with high-end peripherals and shoots to a Best Buy spot in our Power Desktops Top 20.

This PC is fast, keeping up with the typical Pentium-90 in overall performance on our application tests. The 16MB of RAM and 256K of secondary cache certainly don't hurt. In addition, graphics performance gets help from the fast 2MB PCI graphics accelerator. The rest of the features are similarly topflight. A 540MB hard drive and a wide 17-inch monitor offer plenty of file storage and viewing space, and you get a CD-ROM drive to boot. The QP5/90B-2 even comes with a fast 14.4-kbps fax-modem with WinFax Lite. The only popular device this deluxe PC lacks is a sound board, something many business users won't miss.



Quantex

Despite the wealth of devices, this tower's got room for more. Many of the expansion slots are occupied, but you still have at your disposal one dedicated PCI slot, two ISA slots, and one shared slot for either a PCI or an ISA board. As you'd expect in a large system, drive bay expandability is excellent, with seven bays free.

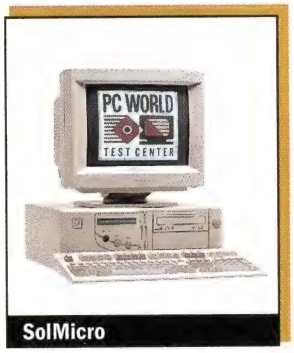
The QP5/90B-2's only real drawback is its scattered documentation—five manuals for the system proper, plus several others for components. However, you've got solid support to fall back on. All policies are adequate or better, including free on-site service for the first year, and the company claims to turn factory repairs around in a single day.

The Quantex QP5/90B-2 is a great deal, plain and simple. For the money, you get cutting-edge performance and a raft of valuable peripherals. No wonder this spacious tower is one of our top choices in a power desktop. *Quantex Microsystems, 800/288-0566, 908/563-4166* **Reader service no. 649**

## SolMicro Intrepid 466

**PROS:** Super-low cost for a multimedia DX2-66, fast modem included
**CONS:** Motherboard flex, short tech-support hours, tech support not toll free

DX2-66 systems have dominated the budget desktop scene for months, but SolMicro's Intrepid 466 caught our attention. Getting a reasonably speedy DX2-66 for $1699 is surprising; that it's decked out for multimedia and fax communications really made us sit up and take notice. This PC's CPU comes from AMD, but the Intrepid 466, which comes with 8MB of RAM and 256K of secondary cache, performs as well as its typical Intel DX2-66 peer.



SolMicro

And you get a 340MB hard drive and a 14-inch monitor with a 1MB VL bus video controller. On top of that, you'll find a CD-ROM drive, a sound card, speakers, and a 9600/14,400-bps fax-modem with fax and data comm software, plus several CD-ROM titles. If you want to add components, two free drive bays and four free expansion slots are at the ready.

No system is perfect. The corner of the motherboard where the CPU sits flexes under pressure, which means you could crack the motherboard while upgrading the processor. Also, while SolMicro's support policies cover the basics, tech reps are available only 9.5 hours per day, and you pay for the call. On balance, however, the $1699 SolMicro Intrepid 466 is a terrific amount of PC for the money. *SolMicro, 510/656-5440* **Reader service no. 650**

## Texas Instruments TravelMate 4000M

PC WORLD TOP 20 3 POWER MOBILE PC

**PROS:** Terrific performance, lots of bundled software
**CONS:** None

Texas Instruments' TravelMate 4000M is one impressive notebook, letting you work first-class even if your seat is in coach. Performance is stunning—the 4000M zoomed ahead of the other DX4-75 notebooks we've seen and even kept pace

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# THE TOP 20 PC WORLD MOBILE PCs

**1 Compaq LTE Elite**
*Pricey, but excels in all respects.*

New this month · Up from last month · No change from last month · Down from last month

## POWER SYSTEMS

| | | Last month | Months on list | Overall rating | Performance rating | Reliability/ service rating | Price | CPU | RAM (MB) | Hard drive (MB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Compaq LTE Elite | 1 | 2 | 105 | 48 | 83/89 | $5949 | DX4-75 | 8 | 340 |
| 2 | Toshiba Portégé T3600CT | – | 1 | 104 | 41 | 80/80 | $4199 | 486DX2-50 | 8 | 250 |
| 3 | TI TravelMate 4000M | – | 1 | 102 | 54 | 69/79 | $4250 | DX4-75 | 8 | 340 |
| 4 | AST Ascentia 900N | 2 | 2 | 100 | 45 | 66/72 | $5949 | DX4-75 | 8 | 510 |
| 5 | NEC Versa S/50 | – | 1 | 98 | 40 | 62/74 | $3899 | 486DX2-50 | 12 | 260 |
| 6 | AT&T Globalyst 200 (486DX2-50) | 3 | 3 | 98 | 41 | 74/83 | $3995 | 486DX2-50 | 8 | 250 |
| 7 | FutureTech FutureMate 7500 | – | 1 | 97 | 58 | 62/71 | $2912 | DX4-100 | 8 | 340 |
| 8 | Dell Latitude XP | – | 1 | 97 | 29 | 69/79 | $4299 | 486DX2-50 | 8 | 390 |
| 9 | Gateway ColorBook DX4-75 | 5 | 4 | 96 | 41 | 62/85 | $3699 | DX4-75 | 8 | 250 |
| 10 | Twinhead Slimnote 550S | – | 1 | 96 | 36 | 62/69 | $2749 | 486DX2-50 | 8 | 340 |

## BUDGET SYSTEMS

| | | Last month | Months on list | Overall rating | Performance rating | Reliability/ service rating | Price | CPU | RAM (MB) | Hard drive (MB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Compaq Contura Aero 4/33C Model 170 | 3 | 5 | 100 | 28 | 83/89 | $1799 | 486SX-33 | 8 | 170 |
| 2 | Toshiba Portégé T3400 | 4 | 6 | 100 | 29 | 80/78 | $1299 | 486SX-33 | 8 | 120 |
| 3 | IBM ThinkPad 500 | 1 | 3 | 99 | 26 | 75/83 | $1699 | Cx486SLC2-50 | 4 | 170 |
| 4 | IBM ThinkPad 355 | 2 | 4 | 98 | 29 | 75/83 | $1999 | 486SX-33 | 4 | 170 |
| 5 | Gateway Handbook DX2-40 | 9 | 4 | 96 | 27 | 62/85 | $1499 | 486DX2-40 | 8 | 130 |
| 6 | Twinhead Slimnote 550S | – | 1 | 92 | 36 | 62/69 | $2749 | 486DX2-50 | 8 | 340 |
| 7 | Toshiba Satellite T1960CS | 7 | 2 | 90 | 31 | 80/80 | $2599 | 486DX2-50 | 4 | 200 |
| 8 | Toshiba Portégé T3400CT | 22 | 1 | 90 | 23 | 80/78 | $2499 | 486SX-33 | 4 | 120 |
| 9 | AT&T Globalyst 200 (486SX-33) | 5 | 3 | 89 | 23 | 74/83 | $2451 | 486SX-33 | 4 | 170 |
| 10 | Gateway ColorBook DX2-40 | 6 | 3 | 89 | 27 | 62/85 | $2699 | 486DX2-40 | 8 | 250 |

Best Buy

[1] CA = color active, CD = color dual-scan, CP = color passive, MP = mono passive.

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to three individual systems' capsule reviews or one capsule plus features table and test reports ($4.95); a complete

**2 Toshiba Portégé T3600CT**
*All-around great subnote.*

**1 Compaq Contura Aero 4/33C**
*Lots of subnote for $1799.*

**2 Toshiba Portégé T3400**
*Super price for peppy subnote.*

| Weight (pounds) | Battery life (hours) | Screen type/size[1] | Vendor contact number | Issue reviewed | Fax reprint number[2] | Comments |
|---|---|---|---|---|---|---|
| 7.2 | 6:32 | CA/9.5" | 800/345-1518 | Oct 94 | 3650 | No. 1 two months straight: Fast, good battery life, reasonable weight, great features—it has it all. |
| 6.2 | 6:48 | CA/8.4" | 800/334-3445 | current | 3653 | Top-ranked subnote has superb battery life and a great though smallish screen. |
| 7.5 | 3:35 | CA/8.5" | 800/848-3927 | current | 3654 | Multimedia-ready notebook with video playback and high-quality sound built in. |
| 8.2 | 6:44 | CA/10.4" | 800/876-4278 | Oct 94 | 3651 | Great performance, nice screen. Mammoth hard drive and a hefty price tag, too. |
| 6.8 | 5:34 | CA/9.5" | 800/284-4484 | current | 3655 | Oodles of RAM in this nicely designed modular unit. |
| 7.4 | 3:33 | CA/9.5" | 800/637-2600 | Sept 94 | 3647 | Fast, reliable, and powerful. A good traveling companion. |
| 8.4 | 3:34 | CD/9.5" | 800/275-4414 | current | 3656 | Fastest notebook we've tested and at a remarkably low price. |
| 7.2 | 6:57 | CA/9.5" | 800/613-3355 | current | 3657 | Superb battery life, the best we've seen, but also the slowest notebook on the Power list. |
| 7.2 | 4:28 | CD/10.3" | 800/846-2000 | Aug 94 | 3641 | Decent power package with large, good screen. |
| 7.4 | 5:21 | CD/9.5" | 800/995-8946 | current | 3658 | Cheapest system on Power list, also Budget no. 6. |
| 5 | 6:18 | CP/7.8" | 800/345-1518 | July 94 | 3637 | Color subnote jumps back to no. 1 spot after steep $600 price slash. |
| 5.8 | 6:31 | MP/8.5" | 800/334-3445 | June 94 | 3627 | Mono subnote with great battery life regains Best Buy with huge $700 price drop. |
| 6.2 | 5:40 | MP/7.5" | 800/426-7735 | Sept 94 | 3648 | Previous multiple Best Buy subnote is a good all-around buy. |
| 6.6 | 5:40 | MP/9.5" | 800/426-7735 | Aug 94 | 3645 | Basic workhorse mono notebook was previous Best Buy. |
| 5 | 5:06 | MP/7.8" | 800/846-2000 | Aug 94 | 3646 | Basic mono subnote could use a larger hard drive. |
| 7.4 | 5:21 | CD/9.5" | 800/995-8946 | current | 3659 | Fast budget system, but also the priciest. Highest-ranked full notebook with color. |
| 8.4 | 3:31 | CD/9.5" | 800/334-3445 | Oct 94 | 3652 | Good all-around color notebook could have better battery life. |
| 6 | 5:30 | CA/7.4" | 800/334-3445 | Apr 94 | 3606 | Color subnote eligible for Budget list after big price cut. Needs larger hard drive. |
| 7.4 | 4:11 | CP/9.5" | 800/637-2600 | Sept 94 | 3649 | Nice design, but slowest budget notebook on Top 20. |
| 7.2 | 4:50 | CD/9.5" | 800/846-2000 | July 94 | 3638 | Good basic color notebook with slightly high price. |

month's review ($9.95 each; April 3004, June 3006, July 3007, August 3008, September 3009, October 3010, November 3011); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

with a typical DX2-66 *desktop* PC. Other features that remind you of a deskbound PC include 8MB of RAM, a 340MB hard drive, and 1MB of video memory.

Yet the 4000M is well tailored for the road. The notebook weighs just 7.5 pounds, including its AC adapter; battery life is a respectable 3.5 hours; and the 8.5-inch active-matrix color screen looks great even in variable light. The keys are flat but respond quickly and quietly. The eraser-head pointing device, located just below the <Space> bar, is also comfortable to use.

The 4000M has lots of connectivity features, including a PCMCIA Type III slot (which alternatively holds two Type II cards); a SCSI II port; a MIDI sound port; audio-in, audio-out microphone jacks; and a built-in speaker and microphone. Extras include disks for playing full-motion video clips, a suite of productivity utilities, and Adaptec's EZ-SCSI software, designed to let you hook up SCSI devices easily. The first SCSI device you may decide to attach is the optional portable CD-ROM with built-in speakers. TI also offers an optional expansion station.

Texas Instruments

TI's support policies are run-of-the-mill, including a one-year warranty and on-site service for $120 per year. Toll-free support lines are open 12 hours each weekday.

In short, for its $4250 price, the TravelMate 4000M offers so much, it almost earns a Best Buy on our Mobile Top 20 chart. *Texas Instruments, 800/848-3927, 512/974-5970* **Reader service no. 651**

# Toshiba Portégé T3600CT

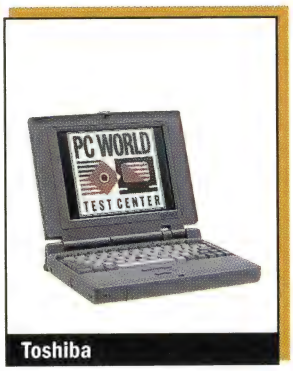
PC WORLD TOP 20 2 POWER MOBILE PC

**PROS:** Much faster than the typical DX2-50 notebook, astounding battery life, three-year warranty **CONS:** None

Toshiba's Portégé T3600CT is proof that the line between subnotes and full-size notebooks grows fuzzier every day. While this slim 6.2-pound unit with an external floppy is compact, it checked in with big performance and a tremendous 6.75-hour battery life. At $4199, this DX2-50 mobile may be priced like a DX4-75, but equipped with 8MB of RAM, it keeps right up with its 75-MHz siblings.

This mobile covers the bases so well, it earns our second-place power mobile Best Buy. Enclosed in the sturdy gray case, the Portégé 8.4-inch active-matrix color screen looks great, and it's supported by a 1MB local bus video controller. The system is easy to use. Its keys are small but comfortable to type on. The pointing device is an eraser-head–like nub in the middle of the keyboard. Although moving the pointer across the screen requires more force than using a typical trackball, we quickly grew accustomed to this device. The Portégé comes with a 250MB hard drive—roomy for a notebook. Windows for Workgroups and CommWorks for Windows communications software are preinstalled.

No docking station is available, but you can buy a variety of cards for the unit's single PCMCIA Type II slot, and a port replicator makes it easy to attach peripherals. Toshiba's support policies are excellent, including a three-year warranty (unusually long for a notebook) and nonstop tech support. Readers responding to our Reliability and Service survey report a high level of satisfaction with their Toshiba notebooks.



Toshiba

In sum, the Portégé T3600CT subnote has everything going for it, including one of the longest battery lives we've seen and by far the best performance available in a system this small. It heartily earns its Best Buy ranking in our Mobile Top 20. *Toshiba America Information Systems, 800/334-3445, 714/583-3000* **Reader service no. 652**

# Twinhead Slimnote 550S

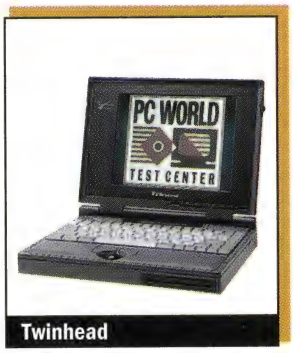
PC WORLD TOP 20 6 BUDGET MOBILE PC

10 POWER MOBILE PC

**PROS:** Fast, excellent battery life, highly modular
**CONS:** None

Looking for speed and long battery life at the right price? Twinhead's $2749 Slimnote 550S with a 486DX2-50 processor and 8MB of RAM is about the fastest budget notebook you can buy. In fact, this notebook performs much like a 486DX2-66 mobile. Plus, its 5.33-hour battery life is excellent.

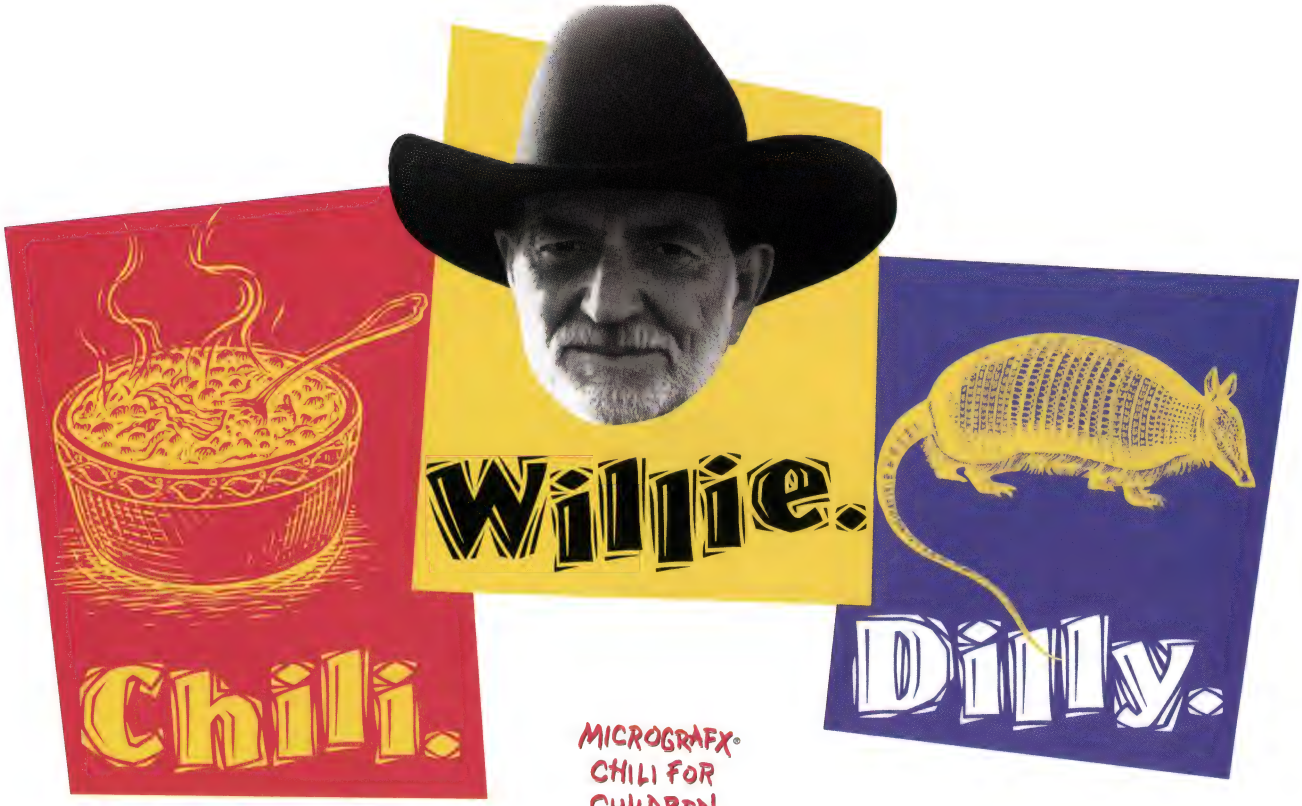
Not only does this Slimnote come nicely stocked with components—such as its 9.5-inch dual-scan color screen and 340MB hard disk—its modularity makes it very upgradable. Two sockets allow for RAM upgrades without removing the original module. You can replace the floppy drive with a second battery pack, a SCSI adapter, or a TV tuner; you can upgrade the screen to active-matrix color; and the trackball can be swapped for a pointing pad. And, yes, even the processor is upgradable, to a DX4-100. The system also has built-in audio, including internal stereo speakers, a microphone, a headphone, and line-out jacks. Of course, there's the usual PCMCIA slot, which takes two Type II cards or one Type III card. The Slimnote's power management settings can be altered on the fly. You can also swap battery packs without shutting off the computer.



Twinhead

The sturdy 7.4-pound unit is reasonably comfortable to use. Some may not cotton to the keys' short travel and loud click, but the built-in trackball, centered on the wrist panel with encircling buttons, works easily, with just a little stiffness to the buttons.

Twinhead's support policies are standard—neither more nor less than you'd expect. Toll-free tech support is available 12 hours a day on weekdays. But support is all that's typical about the Slimnote 550S. Its potent combination of speed, features, and price makes this little traveler a member of both the power and budget sections of our Mobile PCs Top 20. *Twinhead, 800/995-8946, 408/945-0808* **Reader service no. 653**




MICROGRAFX® CHILI FOR CHILDREN

A RECIPE FOR HOPE

Comdex is coming, and so is the hottest event of the year. It's the 6th Annual Micrografx Chili For Children Cook-Off, *6 pm, Tuesday, Nov. 15th* at the Thomas & Mack Center in Las Vegas (U.N.L.V.). Sample the best chili recipes this side of the Rio Grande, prepared by some of the biggest names in the computer industry. Then as a special treat, catch WILLIE NELSON performing live in concert.

## Three Great Reasons To Attend The Sixth Annual Micrografx Chili For Children Cook-Off.

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FEATURES COMPARISON: THIS MONTH'S CONTENDERS—DESKTOPS

# Pentium PCs: Plentiful, and Getting Cheaper

● Yes
○ No
n/a = not applicable

| | Acma P60 | Blackship BLK DX4/100 | Blackship Pentium 90 VLB/PCI | Dell OptiPlex XM 590 | EPS P-90 Explorer | FutureTech System 4414A | BEST BUY Micro Express MicroFlex-VL/66G | MIS M54PI System |
|---|---|---|---|---|---|---|---|---|
| **Standard features** | | | | | | | | |
| Selling price as of 8/5/94[1] | $2597 | $2045 | $2995 | $3779 | $2995 | $1999 | $1749 | $3150 |
| CPU | Pentium-60 | DX4-100 | Pentium-90 | Pentium-90 | Pentium-90 | DX4-100 | 486DX2-66 | Pentium-90 |
| CPU or upgrade socket | 273-pin ZIF | 238-pin ZIF | 296-pin ZIF | 296-pin ZIF | 296-pin | 236-pin ZIF | 238-pin ZIF | 296-pin ZIF |
| BIOS | AMI 1.00.05 | Award 34393 | AMI Plug and Play 5/2/94 | Phoenix 1.10 x13 | Award 6/24/94 | Award 34450 | AMI 34189 | Phoenix 6/7/94 4.03 |
| Installed/maximum RAM (MB) | 8/128 | 8/64 | 16/128 | 16/128 | 16/192 | 8/64 | 8/128 | 8/192 |
| 30-pin or 72-pin SIMMs | 72-pin | 72-pin | 72-pin | 72-pin | 72-pin | 72-pin | 30- and 72-pin | 72-pin |
| SIMM sockets/number free | 4/2 | 4/2 | 4/0 | 4/2 | 6/4 | 4/3 | 4/4 and 2/1 | 6/4 |
| Secondary RAM cache installed/maximum (K) | 256/256 | 256/1024 | 512/512 | 256/256 | 512/512 | 256/1024 | 256/512 | 256/512 |
| Case style | tower | minitower | tower | compact | desktop | compact | tower | tower |
| Free externally accessible 3½/5¼-inch drive bays | 0/2 | 2/1 | 0/3 | 0/2 | 1/1 | 1/2 | 1/3 | 0/3 |
| Free internal 3½/5¼-inch drive bays | 1/4 | 0/0 | 0/1 | 0/0 | 0/1 | 0/0 | 1/1 | 2/2 |
| Free 32-bit EISA/16-bit ISA/8-bit ISA expansion slots | 0/4/0[3] | 0/5/0 | 0/3/0[3] | 0/5/0[4] | 0/2/0[3] | 0/3/0 | 0/3/1 | 0/5/0[3] |
| PCI or VL bus slots/number free[2] | 3 PCI/2[3] | 2 VLB/0 | 4 PCI/2[3] 2 VLB/1 | 2 PCI/2[4] | 4 PCI/2[3] | 2 VLB/0 | 3 VLB/1 | 3 PCI/1[3] |
| Hard disk | Conner CFS420A | Conner CFS420A | Quantum LPS 540S | Quantum LPS 540S | Quantum LPS 540S | Conner CF 5420A | Conner CFA540A | Quantum LPS 540S |
| Size (MB) | 420 | 420 | 540 | 540 | 540 | 410 | 540 | 540 |
| Adapter | integrated | UMC 871 | Qlogic FastSCSI IQ PCI | integrated | OEM | OEM | Promise DC4030VL-2 | Nexstor NXT-93 |
| Floppy drives (MB) | 1.44 | combo | combo | combo | 1.44 | 1.44 | 1.44 | 1.44 |
| Graphics adapter | Diamond Stealth 32 | OEM Cirrus Logic CL5442X VGA | Orchid Kelvin 64 | integrated | Diamond Stealth 64 | Diamond Stealth 32 | ATI Windturbo | STB Nitro PCI |
| Installed VRAM/DRAM (MB) | 0/1 | 0/1 | 0/2 | 0/2 | 2/0 | 0/2 | 2/0 | 0/1 |
| Monitor | Impression 5-5528NG | Standard Tech STA-428C | MGC XGA Color Monitor 1506E | Dell 14ES | ADI 5M515-GP | FutureTech 214AH | MIcroExpress FM 590 | CTX CMS-1561/LR |
| Screen diagonal (inches)/dot pitch (mm) | 15/.28 | 14/.28 | 15/.28 | 14/.28 | 14/.28 | 14/.28 | 15/.28 | 15/.28 |
| Modem speed for fax/data (kbps) | n/a | n/a | n/a | n/a | n/a | 9.6/2.4 | n/a | n/a |
| Sound board | ○ | ○ | ○ | ○ | ○ | Creative Labs SoundBlaster 16 | ○ | ○ |
| CD-ROM drive | ○ | ○ | ○ | ○ | Mitsumi FX001D | Matsushita CR-562-B | ○ | ○ |
| Data transfer rate (K/sec) | n/a | n/a | n/a | n/a | 350 | 300 | n/a | n/a |
| Parallel/serial/mouse/SCSI ports | 1/2/0/0 | 1/2/0/0 | 1/2/0/0 | 1/2/1/0 | 1/2/0/0 | 1/2/0/0 | 2/2/0/0 | 1/2/0/0 |
| **Service and support** | | | | | | | | |
| Warranty (years) | 1 | 1 | 1 | 3 | 3/1[5] | 1.25 | 2 | 1 |
| 30-day money-back guarantee | ●[7] | ● | ● | ● | ●[8] | ● | ● | ●[7] |
| On-site service first-year price | free | free | free | free | free | $49 | $50 | $25 |
| Service center turnaround (days) | 3 | 2 | 2 | ○ | 2 | 1 | 2 | 2 |
| Daily toll-free phone support (hours) | 10 | 10 | 10 | 24 | 12 | 11 | 24[9] | 10 |
| Weekend support | ○ | ○ | ○ | ● | ●[11] | ○ | ● | ○ |
| BBS | ● | ● | ● | ● | ● | ● | ○ | ○ |
| Fax | ● | ● | ● | ● | ● | ○ | ● | ● |

[1] All systems priced as configured with DOS 6.0 or later, Windows 3.1, VGA and color monitor, keyboard, and mouse or other pointing device. Selling price is direct or based on vendor estimate.

[2] VL bus slots also accepts 8- and 16-bit ISA cards.

[3] One less 16-bit slot available when all PCI slots are filled; one less PCI slot available when all 16 bit slots are filled.

[4] Two less 16-bit slots available when all PCI slots are filled; two less PCI slots available when all 16 bit slots are filled.

[5] Three years parts, one year labor.

| | Netis 566P | BEST BUY Quantex QP5/90B-2 | SolMicro Intrepid 466 | USA Flex Pentium 60MHz System | Xinetron X/Lan XP66 |
|---|---|---|---|---|---|
| | $2498 | $3224 | $1699 | $2399 | $2445 |
| | Pentium-66 | Pentium-90 | AMD 486DX2-66 | Pentium-60 | Pentium-66 |
| | 273-pin ZIF | 296-pin ZIF | 238-pin ZIF | 273-pin ZIF | 273-pin ZIF |
| | Award 34534 | AMI 1.00.05axi | Award 4.50 2/28/94 | AMI 34439 | AMI 8/8/93 |
| | 8/192 | 16/128 | 8/64 | 8/128 | 8/128 |
| | 72-pin | 72-pin | 72-pin | 72-pin | 72-pin |
| | 6/4 | 4/2 | 4/2 | 4/2 | 4/2 |
| | 256/256 | 256/256 | 256/256 | 256/256 | 512/512 |
| | compact | tower | compact | tower | minitower |
| | 1/2 | 0/3 | 0/2 | 0/5 | 1/2 |
| | 0/0 | 4/0 | 2/0 | 3/0 | 0/0 |
| | 0/4/0[3] | 0/3/0[3] | 0/3/0 | 0/4/0[3] | 0/3/0 |
| | 3 PCI/1[3] | 3 PCI/2[3] | 0/0 | 3 PCI/2[3] | 3 VLB/1 |
| | Quantum LPS 540A | WD Caviar 2540 | WD Caviar 2340 | WD Caviar 2420 | Conner CFS 420A |
| | 540 | 540 | 340 | 430 | 420 |
| | Future Domain TMC-3260 | integrated | OEM | integrated | Promise DC-4030VL |
| | 1.44 | 1.44 | 1.44 | combo | 1.44 |
| | OEM | OEM Cirrus Logic CL-GD 543x | Alaris Tomahawk | Hercules Stingray 5801 | Cardex W32 |
| | 2/0 | 0/2 | 0/1 | 0/1 | 0/1 |
| | ViewMagic | SuperView 1280 | ViewSonic 6E 1449 | CTX 1562GM | Socos DCM-1568 |
| | 15/.28 | 17/.28 | 14/.28 | 15/.28 | 15/.28 |
| | n/a | 14.4/14.4 | 9.6/14.4 | 14.4/14.4 | n/a |
| | ○ | ○ | Creative Tech SB 16 | ○ | ○ |
| | ○ | Sony CDU33A | Matsushita CR 562-13 | ○ | ○ |
| | n/a | 300 | 300 | n/a | n/a |
| | 1/2/0/1 | 1/2/0/0 | 1/2/0/0 | 1/2/0/0 | 1/2/0/0 |
| | 1 | 1 | 1 | 3 | 1[6] |
| | ● | ● | ● | ● | ● |
| | $75 | free | $79 | $49 | $95 |
| | 2 | 1 | 2 | 5 | 2 |
| | 10 | 11 | 9.5[10] | 24 | 8 |
| | ●[11] | ●[11] | ○ | ● | ○ |
| | ● | ● | ○ | ● | ● |
| | ● | ● | ● | ● | ● |

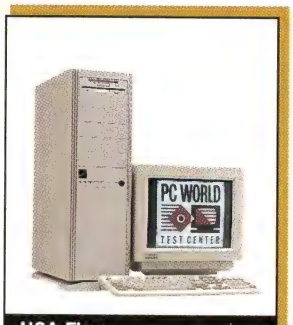
[6] Three years for motherboard.
[7] 45-day money-back guarantee.
[8] 60-day money-back guarantee.
[9] Toll-free weekdays only.
[10] Not toll free.
[11] Saturdays only.

# USA Flex Pentium 60MHz System

PC WORLD TOP 20 12 BUDGET DESKTOP

**PROS:** Good performance, lots of expansion options, 14.4-kbps fax-modem **CONS:** None

USA Flex's latest is simply called the Pentium 60MHz System, but don't let its humble name fool you. This $2399 tower is one of the fastest budget systems you can buy, and it's well decked out with peripherals. With 8MB of RAM, this PC achieved surprising test scores, halfway between those of typical 60-MHz and 66-MHz Pentium systems. We were pleased to find a large 430MB hard drive, a 15-inch monitor coupled with a 1MB PCI graphics accelerator, and a fast 14.4-kbps fax-modem. USA Flex throws in Windows for Workgroups and a handful of other useful preinstalled software.



USA Flex

You might expect great expansion possibilities with this jumbo tower, and you'd be right. It has eight free drive bays and five free slots, two of which accept PCI cards. And USA Flex provides very good support policies, including a three-year warranty and 24-hour toll-free technical support.

The Flex Pentium 60MHz System has a lot to attract the budget conscious. Strong performance, generous expandability, solid components, and dynamite price place it well within our Budget Desktops Top 20. *USA Flex, 800/872-3539, 708/351-9700* **Reader service no. 654**

# Xinetron X/Lan XP66

**PROS:** Great price for a Pentium-66

**CONS:** Sluggish for a Pentium-66, short tech-support hours

Three things in life are certain: death, taxes, and falling PC prices. Even so, it's almost unheard of to find a Pentium-66 system at a budget price, but Xinetron's latest is one of them.

Xinetron

The $2445 X/Lan XP66 performed slightly slower than a typical Pentium-66, despite 512K of secondary cache, a 1MB VL bus caching disk controller, and a 420MB hard drive. Nonetheless, it's among the fastest of budget PCs, and it comes with a 15-inch monitor. Expandability is respectable for a minitower. Four slots are free, including a VL bus slot, as are three drive bays.

Xinetron's support package is good; however, toll-free tech support is available just 8 hours a day, weekdays only. That said, the X/Lan XP66 is an astonishing amount of PC for the money, featuring a large hard disk, ample room to upgrade, and performance close to that of a typical Pentium-66. Even if you throw in an extra $400 to boost RAM to 16MB, you're still paying a bargain price for a system of this CPU class. *Xinetron, 800/345-4415, 408/727-5509* **Reader service no. 655**

FEATURES COMPARISON: THIS MONTH'S CONTENDERS—MOBILE PCs

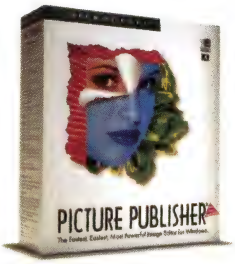
# More Power, More Color, Bigger Hard Disks

● Yes
○ No
n/a = not applicable

| | AST Ascentia 800N | Dell Latitude XP | FutureTech FutureMate 7500 | NEC Versa S/50 | Texas Instruments TravelMate 4000M | BEST BUY Toshiba Portégé T3600CT | Twinhead Slimnote 550S |
|---|---|---|---|---|---|---|---|
| **Standard features** | | | | | | | |
| Selling price as of 8/5/94[1] | $2649 | $4299 | $2912 | $3899 | $4250 | $4199 | $2749 |
| CPU | 486DX2-50 | 486DX2-50 | DX4-100 | 486DX2-50 | DX4-75 | 486DX2-50 | 486DX2-50 |
| Traveling weight (pounds)[2] | 6.8 | 7.2 | 8.4 | 6.8[3] | 7.5 | 6.2 | 7.4 |
| Width x depth x height (inches) | 10.4 x 8.6 x 1.9 | 11 x 8.8 x 2 | 11.1 x 9.5 x 2.3 | 10.8 x 8.3 x 1.8 | 11 x 8.6 x 2.1 | 9.9 x 8 x 1.8 | 11.5 x 8.9 x 2 |
| Installed/maximum RAM (MB) | 4/20 | 8/36 | 8/20 | 12/12 | 8/20 | 8/24 | 8/32 |
| Secondary RAM cache installed/maximum (K) | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 |
| Installed/maximum hard disk (MB) | 250/340 | 390/520 | 340/520 | 260/260 | 340/340 | 250/250 | 340/340 |
| Removable hard disk | ● | ● | ● | ● | ○ | ○ | ● |
| Display type | color dual-scan | color active | color dual-scan | color active | color active | color active | color dual-scan |
| Screen diagonal (inches) | 9.5 | 9.5 | 9.5 | 9.5 | 8.5 | 8.4 | 9.5 |
| Maximum colors or gray shades of LCD | 256 | 256 | 256 | 256 | 256 | 256 | 256 |
| Simultaneous LCD and external monitor | ● | ● | ● | ● | ● | ● | ● |
| Highest resolution of external monitor | 1024 x 768 | 1024 x 768 | 1280 x 1024 | 1024 x 768 | 1280 x 1024 | 1024 x 768 | 1024 x 768 |
| Mouse/keyboard ports | 0/1[4] | 0/1[4] | 1/0 | 0/1[4] | 0/1[4] | 0/0 | 0/1[4] |
| Cursor keys in inverted T | ● | ● | ● | ● | ● | ● | ● |
| Dedicated page-control keys | ○ | ● | ● | ● | ● | ● | ● |
| All 12 function keys dedicated | ● | ● | ● | ● | ● | ● | ● |
| Standard <Ctrl> and <Alt> layout | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Built-in pointing device | ● | ● | ● | ● | ● | ● | ● |
| Modem speed for fax/data (kilobits per second) | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Docking station available | ○ | ● | ● | ○ | ● | ○ | ● |
| PCMCIA slot Type II/III | 0/1[5] | 0/1[5] | 0/1[5] | 0/1[5] | 0/1[5] | 1/0 | 0/1[5] |
| **Power management** | | | | | | | |
| Supports APM | ● | ● | ● | ● | ● | ● | ● |
| Type of battery | NiMH | lithium ion | NiCd | NiMH | NiMH | lithium ion | NiMH |
| Suspend button | ●[6] | ●[6] | ● | ●[6] | ○ | ● | ● |
| Suspends when case closed | ○ | ● | ● | ● | ● | ● | ● |
| **Service and support** | | | | | | | |
| Warranty (years) | 3 | 1 | 1 | 3 | 1 | 3 | 1 |
| 30-day money-back guarantee | ○ | ● | ● | ● | ●[7] | ○ | ● |
| On-site/replacement service price for first year | ○ | $199 | ○ | ○ | $120 | $50 | ○ |
| Turnaround policy (days at service center) | 2 | ○ | 1 | 1[8] | 2 | 2 | 2 |
| Daily toll-free phone support (hours) | 24 | 24 | 11 | 24[9] | 12 | 24 | 12 |
| Weekend support | ● | ● | ○ | ○ | ○ | ● | ●[10] |
| BBS | ● | ● | ● | ● | ● | ● | ● |
| Fax | ● | ● | ○ | ● | ● | ○ | ● |

[1] All notebooks priced as configured with DOS 6.0 or later version, Windows 3.1, VGA monochrome or better display, and mouse or other pointing device. Selling price is direct or based on vendor estimate.
[2] Includes computer, adapter, power cord, and external floppy drive if mobile has one.
[3] 6.4 pounds without external floppy drive.
[4] Mouse port doubles as keyboard port.
[5] Type III slot alternatively holds two Type II devices.
[6] Suspends with key combination.
[7] Available only through TI Express.
[8] Five-day turnaround after one year.
[9] 11.5 hours a day after one year.
[10] Saturdays only.

# Five Bucks Says You'll Never Use Photoshop Again.

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# System Snapshots

These systems present unique and valuable solutions to end-user needs, but they rate lower as business PCs than the preceding group.

## ATronics ATI-Pantera-66

**PROS:** Good performance for the price
**CONS:** Mostly minimal components, short service and support hours

Desktop computer prices keep falling, but it still surprises us to see a Pentium-66 system that costs as little as the $2663 ATI-Pantera-66. And this PC with 8MB of RAM performed well, clocking in slightly behind the average PC of its CPU group in our tests. Its components, however—such as the 340MB hard drive and 14-inch monitor—tend toward the low end.

Expansion options are respectable on this desktop: five free slots, including one for a PCI card, and two free drive bays. Support policies are standard, except for a meager 9 hours of toll-free support, weekdays only.

The ATI-Pantera-66 misses our Top 20 charts, but it's an attractively priced powerhouse. If you don't need great video, you could go for the 1MB graphics card option instead of the supplied 2MB PCI controller, creating a budget PC with power to spare. *ATronics Int'l, 800/488-7776* **Reader service no. 656**

## AT&T Globalyst 510

**PROS:** Two PCMCIA slots, good service and support
**CONS:** Slow, lacks expandability, small hard disk

Are you looking for an office PC? Do you already own lots of PCMCIA devices? AT&T's Globalyst 510, which comes with two PCMCIA Type II slots, could save you money on peripherals. Unfortunately, that's all the expandability this compact has, since it lacks free drive bays and expansion slots. Also, its SX2-50 CPU (essentially a DX2-50 CPU without the internal math coprocessor), along with 8MB of RAM, provides performance below that of a DX2-50. Finally, this PC's 270MB hard drive, 1MB VL bus accelerator, and 14-inch monitor are minimal components these days.

AT&T support is excellent, including a three-year warranty, one year of free on-site service, and 24-hour toll-free support. Even so, the Globalyst 510 falls far short of our Top 20s, since $2282 can buy fuller-featured, faster, and more expandable PCs. *AT&T Global Information Solutions, 800/225-5627* **Reader service no. 657**

## AT&T Globalyst 590

**PROS:** Fast, good service and support
**CONS:** Pricey, all SIMM sockets filled

The Globalyst 590 has an impressive array of components—16MB of RAM, a 2MB PCI graphics controller, and a 540MB Enhanced-IDE hard disk—so it's no surprise it matched the typical Pentium-66 PC in our tests. Also, three free drive bays and five free slots (a mix of PCI and ISA) invite lots of add-ons. You also get an NEC CD-ROM drive. Finally, buyers will appreciate AT&T's three-year warranty, year of free on-site service, and nonstop tech support. The company also provides top-notch documentation for this PC.

Several factors, however, hinder this Pentium-66 system. The SIMM sockets are full, so adding RAM means you have to toss out SIMMs. Also, the 14-inch monitor is the minimum size for an office PC. But the biggest drawback is the high $4216 price. With even better appointed 90-MHz Pentium PCs selling for well under $4000, the Globalyst 590 misses our Top 20 charts. *AT&T Global Information Solutions, 800/225-5627* **Reader service no. 658**

**Desktop computer prices keep falling, but it still surprises us to see a Pentium-66 system that sells for as little as ATronics's $2663 ATI-Pantera-66.**

## Blackship 486DX2-66 Minitower

**PROS:** Very low price
**CONS:** Sluggish for a DX2-66, lower-end components

Blackship redefines the budget end of business computing with its $1495 486DX2-66 Minitower. How did Blackship beat the price down? For starters, by including only 4MB of RAM and an older 1MB VL bus graphics accelerator. This setup may explain why the system behaved more like a DX2-50 PC in our tests. Its 256K of secondary cache and 425MB hard drive are ample for Windows, but the 14-inch monitor is the minimum acceptable size these days. Expandability is so-so. The PC has three free drive bays, but the five available slots are ISA only (including an 8-bit–only slot). Support policies are generally basic.

The Blackship 486DX2-66 Minitower is modestly configured, and slow for a DX2-66, so it does not qualify for our Top 20 charts. However, it has some room to grow, and with its budget price, you'd probably have money left in your budget to grow it. *Blackship Computer Systems, 800/531-7447* **Reader service no. 659**

## Compaq ProLinea 4/66 Model 525/w

**PROS:** Fast for a DX2-66, excellent online and hard-copy documentation, very good support
**CONS:** Expensive for a DX2-66, very little room to add new peripherals.

The 4/66 Model 525/w is the latest in a parade of ProLinea desktops we've reviewed in the last few issues, and it's peppy. Even though its 8MB of RAM and 128K of secondary cache are standard fare, this PC sped past its typical peer in our tests, and it has a big 525MB hard disk.

Still, $2708 is pricey, especially considering the basic 14-inch monitor, 1MB local bus video controller, and limited expandability. You get only three free slots—none of them high-speed—and one free drive bay. Compaq offers great support, however. For example, Compaq preinstalls extensive online documentation, as well as Tabworks, a Windows desktop substitute that makes system navigation a breeze. In addition, the system comes with detailed hard-copy manuals, and it's backed by a three-year warranty and technical support that never sleeps.

High price and little room to grow keep the 4/66 Model 525/w off our Top 20s, but this latest ProLinea reaffirms Compaq's mission to sell quality PCs and back them with terrific support. *Compaq Computer, 800/345-1518* **Reader service no. 660**

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- **Genoa** Hornet 32-Bit (Pentium W/Phantom 64PCI 2 Meg) Windows® Accelerated SVGA Video Card
- **Cobra** 14" .28 Monitor
- **Honeywell** Enhanced Keyboard
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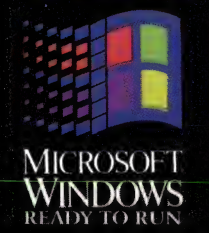
**DX4 100**
**$1849**

**Pentium 60**
**$1999**

**Pentium 90**
**$2399**

**Price Includes Freight!**

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## DTK Quin-32

**PROS:** Inexpensive for a Pentium-60, Enhanced-IDE hard drive

**CONS:** Interlaced monitor

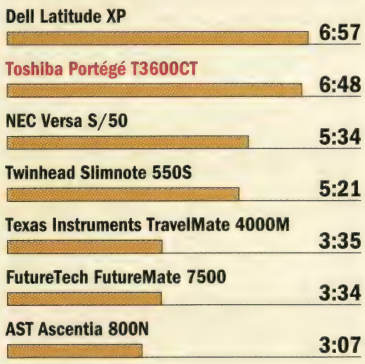
With a street price of $2500, the DTK Quin-32 Pentium-60 joins the still-elite group of budget Pentiums. And this contender, with 8MB of RAM and 256K of secondary cache, finished the tests with typical scores for PCs of its CPU class overall, and it did well in the disk-intensive application tests, especially running Paradox for DOS. Still, this computer's components are far from lavish: a 360MB hard drive, a 1MB VL bus video controller, and a small 14-inch monitor incapable of noninterlaced resolutions. Expandability is good, with four drive bays and five ISA slots (one 8-bit ISA only) free.

Other than a standout 24-month warranty, DTK's service and support doesn't stray from the beaten path. However, instead of a money-back guarantee, the company offers system replacement.

Even though the DTK Quin-32 is too sparsely appointed to reach our Top 20 lists, it delivers Pentium power at a budget price. *DTK Computer, 800/289-2385, 818/810-0098* **Reader service no. 661**

### BATTERY LIFE TEST REPORT

#### Dell's Latitude Has the Longest Battery Life Yet




Best Buy in red

Time in hours:minutes.

**Methodology**
We drain and fully recharge the battery and set power-saving options to match a consistent profile where possible. Office workers type at regular intervals in Word for Windows, saving periodically. Notebooks are rotated among workers to even the workloads. We report the time elapsed until the notebook shuts itself off.

**Data based on tests designed and conducted by the PC World Test Center. All rights reserved.**

## Hertz 486/D66X2e

**PROS:** Fabulous price for a DX2-66 PC

**CONS:** Below-average performance for a DX2-66, limited expandability, no mouse

Hertz Computer's 486/D66X2e costs just $1595 direct, making it one of the least expensive DX2-66 systems you can buy. But while the machine comes with 8MB of RAM, performance was slow for a DX2-66, and this PC's 260MB hard drive, 14-inch monitor, and 1MB VL bus graphics controller are strictly entry-level. Expandability is so-so. The 486/D66X2e has five free ISA slots and a pair of free drive bays, but you have to pull RAM to add RAM. Also, the 486/D66X2e is strictly BYOM (bring your own mouse).

Service and support is mostly unexceptional, but tech support involves a toll call. While the 486/D66X2e doesn't come within range of our Top 20 charts, budget-minded buyers, especially those who live within local calling distance of this New York City company, may want to check this system out for basic computing needs. *Hertz Computer, 800/232-8737, 212/684-4141* **Reader service no. 662**

## Panasonic CF-V21P

**PROS:** CD-ROM and TV video option, large 10.4-inch active-matrix color screen

**CONS:** Steep $5799 price, slow for DX4-75, very short 1-hour battery life

Panasonic's CF-V21P has several strong features. For one, it's unique among totables with its *multimedia pocket*, an externally accessible bay that accepts either a nonstandard CD-ROM drive or a module that lets you view TV on the PC's screen. It has a luxurious 10.4-inch active-matrix color screen. We were also impressed by the exceptionally large 450MB hard disk. Panasonic's support polices offer no surprises.

Unfortunately, the CF-V21P stumbles in several key areas. One is poky performance for a DX4-75, likely due to the scant 4MB of RAM. Another is the very short 1-hour battery life. Most serious is the stiff $5799 sticker, making this one of the priciest notebook computers around. This PC falls far short of our Top 20 lists, but it's an option for those who need its special CD-ROM and video abilities. *Panasonic Personal Computer, 800/527-8675* **Reader service no. 663**

## Tandy 3200

**PROS:** Bargain-basement price

**CONS:** Very slow, poor monitor, limited expandability, tech support not toll free

Tandy's $1195 486SX-33 desktop caters to nonpower users. Given the 3200's 4MB of RAM, we knew it wouldn't burn up the test track, but it doesn't fall way behind the typical SX-33 either. The 14-inch monitor has a coarse .39-inch dot pitch that can make graphics and small fonts hard to view. The VL bus graphics controller comes with 512K of DRAM—too little for some graphics programs and multimedia titles—and the 210MB hard disk is the minimum for many Windows users. Expandability is limited to three ISA boards and a pair of drives. Radio Shack stores provide on-site service for a fee, but technical support requires a toll call and is available just 8 hours a day, weekdays only.

The 3200 does not come close to our Top 20 charts, but it's an option for the cost conscious with basic computing needs. *Tandy, 817/390-3011* **Reader service no. 664**

## Twinhead Slimnote 60T

**PROS:** Searing performance, vivid display

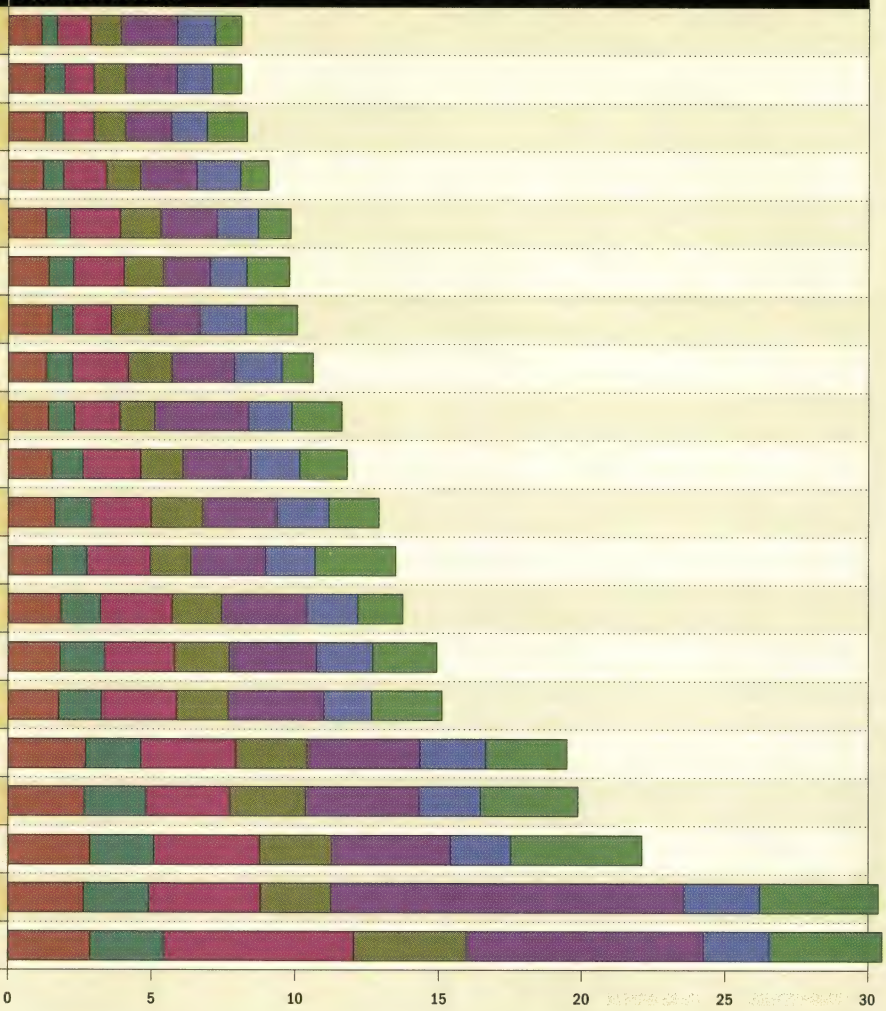
**CONS:** High price, short battery life, heavy, no built-in trackball

Twinhead's Slimnote 60T is the first notebook on our test bench to boast a Pentium-60 processor. Stoked with 8MB of RAM, it galloped through our test suite, posting some of the fastest times we've seen from a mobile PC. The Slimnote 60T comes with a beautiful 9.5-inch active-matrix color display and an ample 340MB hard drive.

This notebook might have been in our Top 20 were it not for a few significant drawbacks. Road warriors expect much more than this PC's 2 hours of battery life, and its 8.4 pounds is on the heavy side. The Slimnote 60T has a comfortable keyboard but lacks a built-in pointing device. Twinhead support is solid if unremarkable. All in all, considering the Slimnote 60T's steep $4995 price, we expected to find fewer handicaps. *Twinhead, 800/995-8946, 408/945-0808* **Reader service no. 665**

# Pentium-90s, Pentium-66s Monopolize Top Performance Spots

| Overall performance rating | | Application test times |
|---|---|---|
| 102 | **EPS P-90 Explorer** Pentium-90 desktop | |
| 98 | **Dell OptiPlex XM 590** Pentium-90 desktop (compact) | |
| 96 | **Quantex QP5/90B-2** Pentium-90 desktop (tower) | |
| 90 | **Netis N566P** Pentium-66 desktop (compact) | |
| 83 | **Acma P60** Pentium-60 desktop (tower) | |
| 81 | **Xinetron X/Lan XP66** Pentium-66 desktop (minitower) | |
| 80 | **Blackship Pentium 90 VLB/PCI** Pentium-90 desktop (tower) | |
| 77 | **USA Flex Pentium 60MHz System** Pentium-60 desktop (tower) | |
| 72 | **MIS M54PI System** Pentium-90 desktop (tower) | |
| 69 | **Blackship BLK DX4/100** DX4-100 desktop (minitower) | |
| 62 | **Micro Express MicroFlex-VL/66G** 486DX2-66 desktop (tower) | |
| 61 | **FutureTech System 4414A** DX4-100 desktop (compact) | |
| 58 | **FutureTech FutureMate 7500** DX4-100 notebook | |
| 54 | **SolMicro Intrepid 466** AMD 486DX2-66 desktop (compact) | |
| 54 | **TI TravelMate 4000M** DX4-75 notebook | |
| 41 | **Toshiba Portégé T3600CT** 486DX2-50 notebook | |
| 40 | **NEC Versa S/50** 486DX2-50 notebook | |
| 36 | **Twinhead Slimnote 550S** 486DX2-50 notebook | |
| 29 | **Dell Latitude XP** 486DX2-50 notebook | |
| 28 | **AST Ascentia 800N** 486DX2-50 notebook | |




Best Buys in red — Time in minutes

Systems are arranged in order of overall performance from best to worst, based on the normalized, weighted scores from seven tests. A system may have a better overall performance rating than another system that took less time to complete our test suite.

**Methodology**

We tested each system as supplied by the manufacturer, using the version of DOS supplied. If we installed Windows, we used the default installation. We configured Windows with an HP LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. We set video resolution to 800 by 600 pixels in 256 colors using the supplied video driver where possible. We loaded the test applications and files and test automation software and scripts.

**Word 2.0 for Windows**

We worked with 1-, 9-, and 28-page business documents. Operations included creating, saving, opening, scrolling, editing, checking spelling, formatting, previewing, and printing.

**Excel 4.0**

We opened a file and performed several data extracts, entered new data, altered calculations, formatted, scrolled, moved blocks, previewed, printed, and saved.

**Paradox 1.0 for Windows**

We used a custom form to add a moderate number of records to an existing table, performed several queries, and generated a report.

**Freelance 1.0 for Windows**

We built a six-page presentation using a standard template, clip art, text, and charts; applied several views to the presentation; and previewed and saved it.

**WordPerfect 6.0 for DOS**

We performed a variety of editing, formatting, previewing, and printing tasks on documents ranging from a single-page memo to a long report. Due to memory requirements, the amount of free memory for DOS in the first 640K dramatically affects this test.

**1-2-3 release 3.4 for DOS**

Using the graphical Wysiwyg add-in and working in three different files, we created and altered formulas, built graphs, saved, and printed.

**Paradox 3.5 for DOS**

We tested Paradox 3.5 running under Windows in a DOS window. We entered data, searched records, updated, and generated reports from a simple customer list.

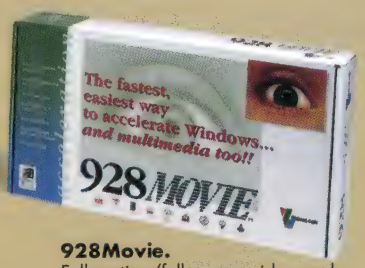
**Data based on tests designed and conducted by the PC World Test Center. All rights reserved.**

Other boards: Everything runs slow.
Movies are small and choppy.

# FULL-MOTION VIDEO ACCELERATORS, YET

## Introducing 928Movie™. Full screen and full motion video from just one affordable board.

Wonderful things happen when a super, high performance video graphics accelerator chip gets together with our proprietary video playback chip. "Not only is **928Movie** among the fastest 928-based accelerators we've seen", said PC Magazine (6/28/94) "it also scales up .AVI clips as small a 160 x 120 pixels, and as fast as 30 fps, to full screen without losing frames."

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928Movie: Everything runs faster, larger and smoother.

# ANOTHER INSTANCE WHERE SIZE IS EVERYTHING.

In short, "**928Movie**...sets a new standard for playback of video clips." (Multimedia World, 8/94). The board "is easy to set up" (PC Week, 5/31/94), and will support any industry standard VM Channel add-on. See the amazing **928Movie** demonstration at Best Buy, CompUSA, Good Guys, Computer City and Lechmere, or call 1-800-494-4901 to find out more information on how **928Movie** will truly complete your multimedia system.

★★★★★ As Reviewed in MULTIMEDIA WORLD

VideoLogic

Circle 248 on reader service card

# WHAT HAPPENS WHEN YOU ADD SIZE TO AN ALREADY EXTRAORDINARY PACKAGE?

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The new ergonomically and aesthetically designed Elite series of monitors from MAG Innovision have features that other monitors just can't touch. And the fact that they only come in the larger 15-inch, 17-inch and 21-inch sizes with the most advanced CRT technologies makes them truly fantastic. Advance Display Calibration, Green Energy and LCD displays combined with ultra high resolutions up to 1600 x 1280, lightening-quick refresh rates and crystal clear dot pitches make them impossible to beat. And since they're so reliable, we'll even throw in a 3-year limited warranty.

So pick one up at a MAG InnoVision dealer near you. Their larger size and imposing features are liable to dominate the market for years to come and they cost a lot less than, say, an NBA draft pick these days.

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# Top 10 Windows Accelerators: Two Newcomers Excel

How tight is the competition between graphics board vendors? A look at our Top 10 list says it all. The difference between first and tenth place on the chart is 3 points on our overall value scale. At the same time, the average overall value score of Top 10 boards has soared some 16 points in three months, from about 85 in August to about 91 this month. Though performance gains have been incremental—the average overall WITS score for Top 10 boards has risen about 3 points since August—prices continue to fall. The average street price of Top 10 graphics boards has dropped from around $295 in August to about $243. Vendors are enhancing value even further by offering higher refresh rates and more comprehensive driver sets.

**Top 10 boards' average value score has soared 16 points in 3 months.**

The two new boards tested this month—the Hercules Dynamite Power PCI and STB Powergraph Pro PCI—are cases in point. The $215 Dynamite Power PCI board moved into fifth place with an astounding 75.5 overall WITS score—the best ever from a DRAM board and well ahead of its VL twin, the Dynamite Power VL, which posted a 70.9 overall WITS score in September. The Dynamite Power PCI also posted the best graphics-oriented performance (CorelDraw, QuarkXPress, PhotoStyler) of any board we've tested, beating VRAM heavyweights such as the Number Nine #9GXE64 Pro, though it fell in the middle of the Top 10 in business-oriented apps such as WinWord, Excel, and Freelance. Hercules has also updated its software, delivering higher refresh rates at 640 by 480 and 800 by 600 resolutions, and adding more non-Windows drivers.

The $269 STB Powergraph Pro PCI, meanwhile, proves that a balance of price, performance, and features really pays off. The Powergraph Pro distinguished itself with the third-fastest performance ever turned in by a DRAM board, earning an overall WITS score of 73.4—behind only the ATI Graphics Xpression and Hercules Dynamite Power PCI among DRAM competition. In addition to a simple installation routine and comprehensive driver set, the Powergraph Pro also gets a big boost from STB's impressive support. A lifetime warranty, plus toll-free technical support, helped propel the Powergraph Pro PCI into fourth place on our Top 10 chart.

*WITS was developed by Jon Peddie Associates, a consulting firm specializing in PC graphics technology. Jon Peddie and Fred Dunn are the principal officers of Jon Peddie Associates.*

## TOP 10 ACCELERATORS

New this month · Up from last month · No change from last month · Down from last month

| | | Overall value | Estimated street price | Windows Integrated Test Suite scores: Word 2.0 for Windows | Excel 4.0 for Windows | CorelDraw 3.0 | PhotoStyler 1.1 | QuarkXPress 3.11 | Freelance Graphics 2.01 | Overall WITS score | Bus type | RAM (MB/type)[1] | Chip/driver date | Reader service number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **ATI Graphics Xpression** 905/882-2600 | 93 | $250 | 13.4 | 16.6 | 13.2 | 11.6 | 15.6 | 4.8 | 75.1 | PCI | 2 / D | 88000CX 4/11/94 | 666 |
| 2 | **STB LightSpeed** 800/234-4334 | 92 | $199 | 12.5 | 14.5 | 12.6 | 11.4 | 14.7 | 5.9 | 71.5 | VL | 2 / D | ET4000/W32p 4/10/94 | 667 |
| 3 | **Diamond Stealth 32** [2] 800/380-0030 | 91 | $249 | 13.6 | 15.5 | 13.3 | 11.5 | 12.2 | 6.0 | 72.2 | PCI | 2 / D | ET4000/W32p 12/29/93 | 668 |
| 4 | **STB Powergraph Pro PCI** 800/234-4334 | 91 | $269 | 12.8 | 15.6 | 12.2 | 11.7 | 14.6 | 6.6 | 73.4 | PCI | 2 / D | Vision864 5/9/94 | 669 |
| 5 | **Hercules Dynamite Power PCI** 800/532-0600 | 91 | $215 | 13.2 | 15.2 | 13.3 | 12.8 | 15.3 | 5.7 | 75.5 | PCI | 2 / D | ET4000/W32p 5/11/94 | 670 |
| 6 | **Diamond Stealth 64** [2] 800/380-0030 | 90 | $315 | 13.5 | 17.9 | 13.1 | 11.2 | 12.9 | 8.5 | 77.1 | VL | 2 / V | Vision964 4/4/94 | 671 |
| 7 | **Number Nine #9GXE64** 800/438-6463 | 90 | $249 | 12.8 | 14.7 | 10.3 | 11.5 | 14.3 | 6.5 | 70.1 | PCI | 2 / D | Vision864 4/26/94 | 672 |
| 8 | **Number Nine #9GXE64 Pro** 800/438-6463 | 90 | $356 | 13.7 | 16.8 | 12.9 | 11.9 | 15.6 | 8.0 | 78.8 | PCI | 2 / V | Vision964 4/26/94 | 673 |
| 9 | **Boca Voyager** 407/997-6227 | 90 | $145 | 12.6 | 13.8 | 12.8 | 11.6 | 14.1 | 4.6 | 69.4 | VL | 1 / D | F64300 3/22/94 | 674 |
| 10 | **STB Nitro** 800/234-4334 | 90 | $189 | 12.2 | 13.4 | 13.1 | 12.6 | 14.7 | 4.1 | 70.2 | PCI | 2 / D | GD5434 2/18/94 | 675 |

**Methodology** Boards were tested at 1024 by 768 resolution at 256 colors and a minimum 70-Hz refresh rate on a 486DX2-66 with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. The overall value score balances performance, estimated street price, and features. The overall WITS score is the aggregate of the application scores. For all scores, higher is better.

[1] D = DRAM, V = VRAM.
[2] Comparable value offered by other bus versions tested.

**For more information about all products in this table, circle reader service no. 901.**

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Word about PCs from Hewlett-Packard is getting around, and ratings are soaring. According to a recent CRN/Gallup survey, "Use of HP desktops in Fortune 1000 companies has doubled in the last year."[‡]

And with good reason. Our broad range of PCs not only meets users' expectations for power and ease of use, it also answers the needs of a network manager. With built-in features like on-board networking, advanced security and asset tracking, HP PCs have what it takes to be top performers on virtually any network. And soon our expertise in network management will reach all the way to the desktop, as we continue to pioneer the development of DMI (Desktop Management Interface).

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## Give your other PCs something to look up to.

If you're connecting PCs to a network, scan this chart and you'll see it's time to hook up with HP.

| STANDARD NETWORKING FEATURES | HP VECTRA XM2 PC | HP VECTRA M2 PC | COMPAQ DESKPRO/XE | DELL NETPLEX |
|---|---|---|---|---|
| Advanced Bus Architecture | PCI | VL | | |
| Integrated Networking Interface | 32-bit | 16-bit | | |
| Integrated, multiprotocol Boot-ROM | X | X | | |
| ISA Plug-n-Play Compliant | X | X | X | |
| Multilevel Security Features | X | X | X | X |
| Asset tracking | X | X | X | |
| PC tattooing | X | X | X | |
| Optional Desktop Management Software | X | X | | |
| Bi-directional parallel port | X | X | X | X |
| Desktop Management Interface (DMI)[3] | X | X | | |

HP quality in value-priced PCs.

- *Intel 33-MHz 486SX, 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive; Intel 60-MHz Pentium*
- *Chip upgrades to higher performance*
- *On-board accelerated local-bus video*
- *210-MB hard drive[1]*
- *4-MB RAM, expandable to 64-MB*
- *512 KB or 1 MB of Video RAM standard*
- *ISA Plug-n-Play compliant*

## HP Vectra VL2

- *Desktop Power Management*
- *EPA Energy Star certified*
- *Local bus Fast-IDE hard disk interface**
- *1280 x 1024 video resolution**
- *Optional 128- or 256-KB cache memory**
- *Free three-year limited warranty for parts and labor[2]*

*from*
$1,049†

High-performance network-ready PCs in a slimline package.

- *Intel 33-MHz 486SX, 50- and 66-MHz 486DX2, upgradable to Pentium Overdrive*
- *Optional 128- or 256-KB second level cache*
- *210-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit Fast-IDE local-bus hard disk interface*
- *8-MB RAM, expandable to 96-MB*
- *Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution*

## HP Vectra N2

- *1 MB of video RAM standard, expandable to 2 MB*
- *Slimline package with two mass storage shelves and three ISA slots*
- *Optional integrated 10Base-T networking*
- *Multilevel security*
- *EPA Energy Star certified*
- *ISA Autoconfiguration utility (Plug-n-Play)*
- *Integrated Desktop Management Interface (DMI)[3]*
- *Free three-year limited warranty for parts and labor[2]*

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High-performance PCs for the connected office.

- *Intel 33-MHz 486SX; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive*
- *Optional 128- or 256-KB second level cache*
- *Four mass storage shelves; four expansion slots*
- *One available 32-bit VL-bus slot*
- *210-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit Fast-IDE local-bus hard disk interface*
- *8-MB RAM, expandable to 96-MB*

## HP Vectra M2

- *Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution*
- *Optional integrated 10Base-T networking*
- *Systems Diagnostics Utility*
- *EPA Energy Star certified*
- *ISA Autoconfiguration utility (Plug-n-Play)*
- *Integrated Desktop Management Interface (DMI)[3]*
- *Free three-year limited warranty for parts and labor[2]*

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$1,509†

Exceptional 486 performance for advanced business use.

- *Intel 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive*
- *PCI architecture*
- *Standard 256-KB second level write-back cache*
- *Four mass storage shelves; four expansion slots*
- *Two available 32-bit PCI expansion slots*
- *210-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit PCI IDE hard disk interface*

## HP Vectra XM2

- *8-MB RAM, expandable to 96-MB*
- *PCI Integrated 64-bit S3 Vision-864 graphics accelerator supporting up to 1280 x 1024 resolution*
- *Optional PCI Integrated 32-bit 10Base-T networking*
- *Integrated Desktop Management Interface (DMI)[3]*
- *EPA Energy Star certified*
- *Free three-year limited warranty for parts and labor[2]*

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The ultimate PC for advanced business and technical applications.

- *Intel 90-MHz Pentium Processor*
- *Second processor socket for MP Spec 1.1 multi-processing*
- *Standard 256-KB second level asynchronous or burst asynchronous write-back cache*
- *PCI architecture*
- *Four mass storage shelves (three front accessible); five expansion slots*
- *Two available 32-bit PCI expansion slots*
- *270-MB, 12-ms Fast SCSI-2 hard drive[1]*

## HP Vectra XU

- *Integrated 32-bit PCI SCSI-2 interface*
- *PCI integrated 64-bit S3 Vision-864 graphics with 1280 x 1024 resolution or PCI MGA Ultima Plus graphics with up to 1600 x 1200 resolution*
- *32-bit PCI IDE hard disk interface*
- *8 or 16 MB of RAM, expandable to 256 MB*
- *PCI Integrated 32-bit 10Base-T networking*
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Sound Blaster
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With hundreds of today's hottest titles written for Sound Blaster™ cards, there are so many tough decisions. Like which game to buy? Will it be the thunderous explosions in Rebel Assault, or the eerie howling of 7th Guest? Either way, you'll hear new sounds that were in your programs all along. The Sound Blaster Value Edition card is the most economical way to introduce yourself to the fun and games of sound. It's an 8-bit sound board that adds impact to thousands of applications and comes with several Windows-based sound utilities.

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Games are not the only software designed for Sound Blaster cards. Imagine a math program with a vast array of sound effects. Or picture 15th century England where you venture into a whole world that looks, feels and sounds authentic. It's mesmerizing. It's hypnotic. Especially if you have the Sound Blaster Pro Value Edition, the 8-bit sound card with stereo sound. It's compatible with Creative Labs CD-ROM drives, and comes with innovative sound utilities and recording software.

# Tough d
# Choose one S
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## The 16-bit decision.

Stepping up to 16-bit sound means exploring a world of realistic sound. The Sound Blaster 16 Value Edition is the best-selling sound card ever. It's the affordable way to add true 16-bit CD-quality audio to business, multimedia and home applications that meet MPC2 standards. It includes a built-in CD-ROM interface for Creative Labs CD-ROM drives and a free library of utilities. And after experiencing a 16-bit game on Sound Blaster, you'll bolt to a nearby window, stick your reverberating head outside, and start screaming like a banshee, "I WANT 16-BIT SOUND!"

Sound BLASTER

Of course, all Sound Blaster cards are easy to install and give you 100% compatibility with all software written for the Sound Blaster audio p

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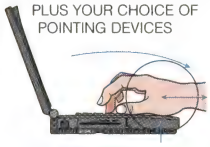

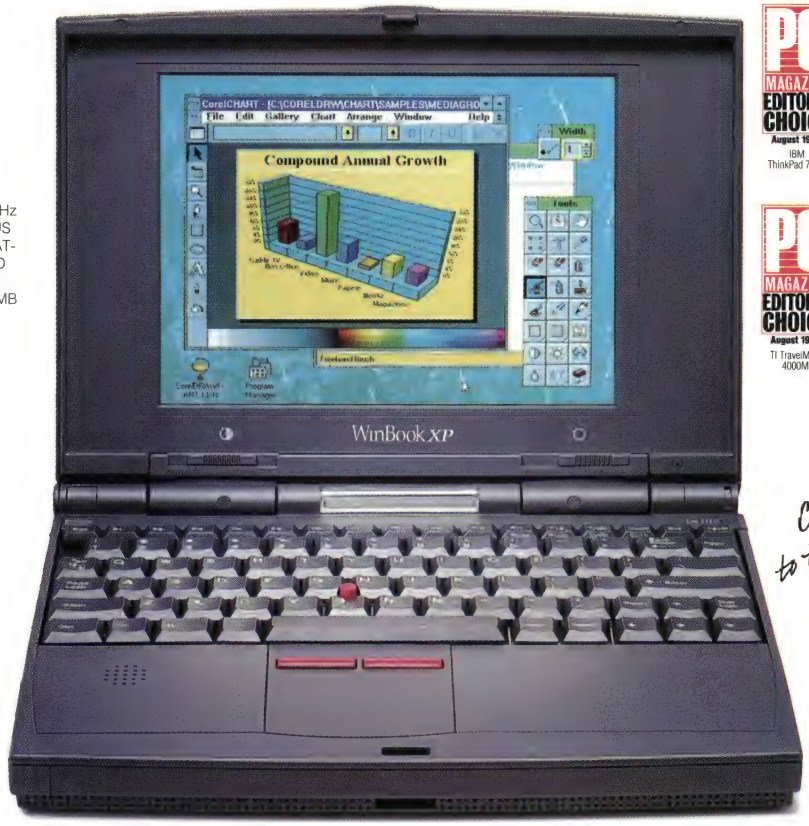


PC MAGAZINE EDITORS' CHOICE August 1994 — IBM ThinkPad 755C

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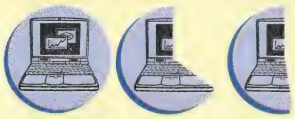

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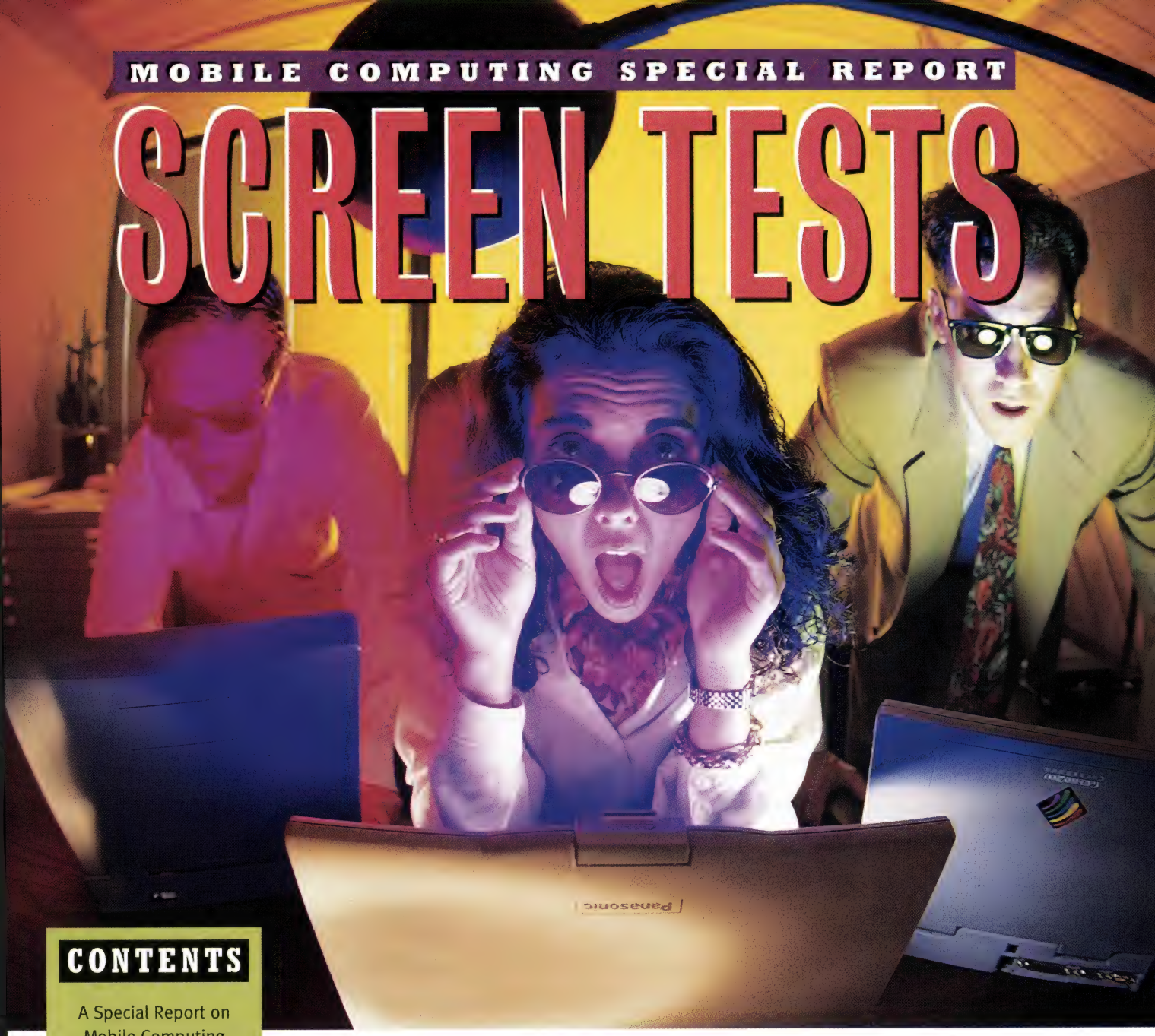
MOBILE COMPUTING SPECIAL REPORT

# SCREEN TESTS



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**We put the most popular types of notebook screens in front of 47 typical users to find out which they liked best. Their answers surprised us. By Dean Andrews**

Those top-of-the-line active-matrix color displays send the price of notebook computers soaring. But they sure look great. Active-matrix screens burn up more power, quickly bleeding precious battery life. But they sure look great, right?

Think again. Appearances *can* be deceiving. According to a series of usability tests conducted by the PC World Test Center, active-matrix displays are not always the best choice. For some tasks, users in our study actually selected passive displays because they caused less eyestrain.

PHOTOGRAPH BY CHIP SIMONS

Selecting the right type of screen is probably the most important decision a notebook computer buyer needs to make. But determining which screen is right for your machine can be difficult given the dizzying array of models, styles, sizes, and prices—and the seemingly varying quality—of notebook displays.

## The Eye of the Beholder

People who use a notebook computer as their desktop-on-the-road obviously have different screen quality needs from the legion of sales and marketing personnel who use notebooks for presentations. Notebook presenters—who often must deal with people crowded around conference tables, all angling for position—are concerned with their screen's brightness, color quality, and readability at a variety of distances and angles. For people who travel with a notebook, using one can mean squinting at a screen in dimly lit airports and under low-wattage light bulbs in hotel rooms. Business travelers need to work for hours at a time under different lighting conditions without eyestrain; for them, the ability to see the screen from a variety of angles can actually be a detriment—if you're flying, you don't want the person seated next to you to see confidential documents on your notebook screen.

While these two groups of people need different things from their screens, they both, of course, want quality for their money.

The PC World Test Center staff designed experiments to answer some basic questions about notebook displays. We wanted to know whether the choice of display technology—active matrix or passive—made a difference in users' ability to work productively for long hours without straining their eyes. (For a description of display technologies, see "What's Going On Behind the Screens.") We also wanted to determine whether the screens within each technology type were all roughly equivalent, regardless of manufacturer. In addition, we wanted to find out whether people were more impressed by presentations shown on active-matrix screens than on passive models.

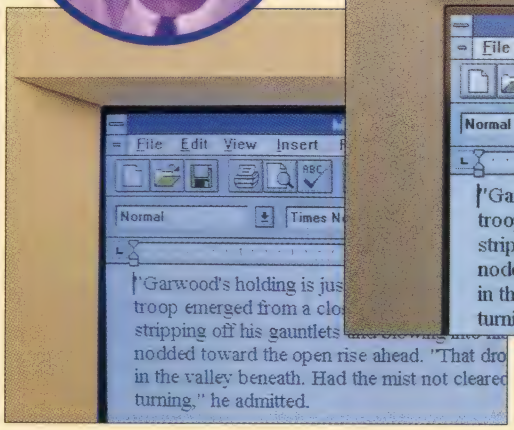
To help us evaluate a range of notebook screens from our past *PC World* Top 20 lists, we brought in 47 people with diverse backgrounds, from college professors to graphic artists. With a nod to theatrical stage design, we converted our usability lab into two faux settings: one resembling an office and the other a hotel room. To test the screens under the different lighting conditions of each setting, we put roughly half the participants under the fluorescent lighting found in most offices, and the other half under the incandescent lighting of the average hotel room.

In a separate test gauging the effectiveness of screen quality in group presentations, we compared the viewers' responses to both an active-matrix display and a passive display.

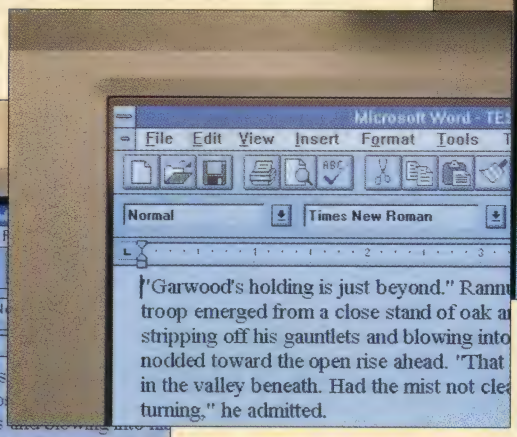
**Test Results**

## Sight Savers: Active-Matrix Screens Are the Choice Under Incandescence

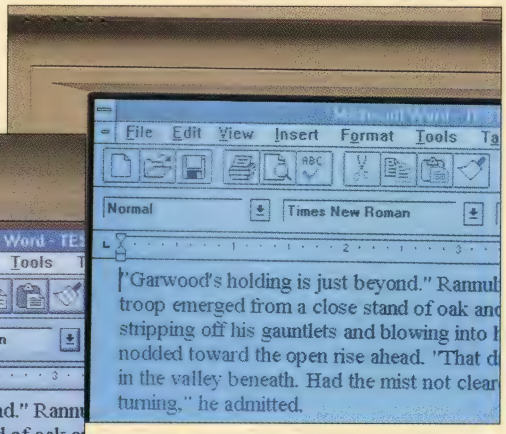
The PC World Test Center found that the lighting conditions under which a notebook screen was viewed determined the degree of eyestrain experienced by test participants. When reading under incandescent light, participants found Sharp's active-matrix screen, in Acer's AcerNote 780cx, easiest on the eyes.




**Compare this benchmark desktop display to the notebook displays on the right.**




**Rated #1**
**Incandescent Lighting**
**Active-matrix Sharp screen in Acer's AcerNote 780cx**




**Rated #2**
**Incandescent Lighting**
**Passive screen from Sanyo in Gateway's Colorbook 486DX2-50**

## Taster's Choice

We tested dozens of notebooks to choose the final four screens for our readability and eye-fatigue tests. Each user ranked the screens after viewing two screen images. Without knowing the notebook's screen type or vendor, our users ranked all the active-matrix screens higher than the passive models.

From this sampling, we then chose the highest ranked active-matrix screen, made by Matsushita (on the Panasonic CF-V21P notebook); the highest-ranked passive screen, by NEC (on Aspen's Aspenta 3600); a middle-ranked active-matrix screen, by Sharp (on Acer's AcerNote 780cx); and a middle-ranked passive screen, by Sanyo (on the Gateway Colorbook 486DX2-50).

AcerNote 780cx: Our tests showed that active-matrix screens were easiest on the eyes under incandescent lights, as in this hotel room at San Francisco's Ritz-Carlton.

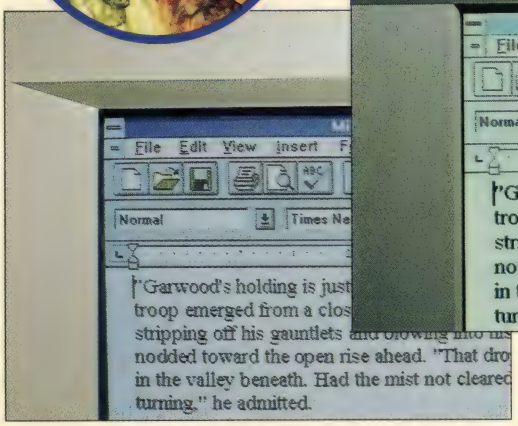
GERRY GROPP

At a glance, the active-matrix screens do look more impressive and seem to offer a higher-quality display—better, crisper resolution and higher luminescence. Our readability/eye-fatigue tests were based in part on experiments done by James Sheedy, an optometrist at the University of California at Berkeley's School of Optometry. We tested 16 people and found their visual acuity to be at least 14/28, which is good vision at a reading distance. We weren't concerned with whether they used contact lenses, glasses, or bifocals—just so they could see clearly.

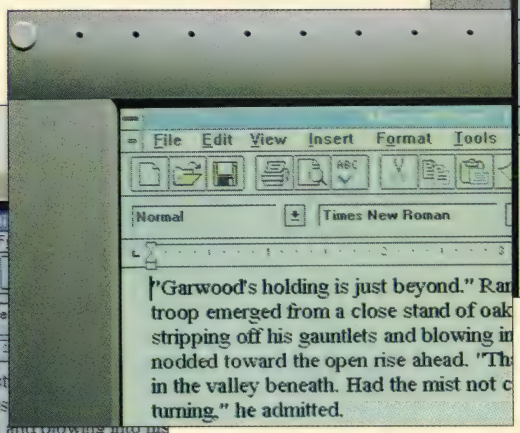
Each person read for five 20-minute periods separated by half-hour rest periods. Since we didn't want the participants to lose interest in what they were reading, we selected a wacky fantasy-adventure novel, *Winter Knight* by Deborah DeFrank, which we downloaded into Microsoft Word for Windows.

## Seeing the Light: Passive Screens Are Best Under Fluorescence

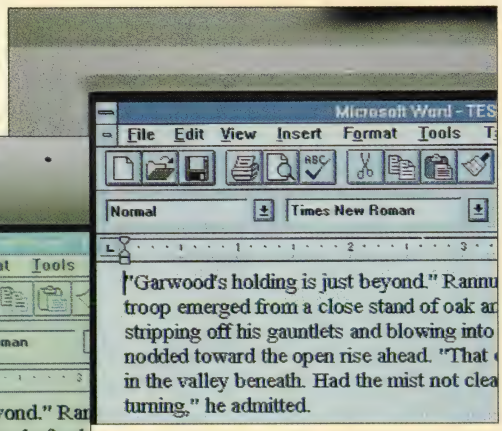
Test participants had an entirely different—and unexpected—reaction to reading on notebook screens under fluorescent lights. While the participants found active-matrix screens most appealing, they still reported less eyestrain overall reading the passive NEC screen in Aspen's Aspenta 3600.




**Compare this benchmark desktop display to the notebook displays on the right.**



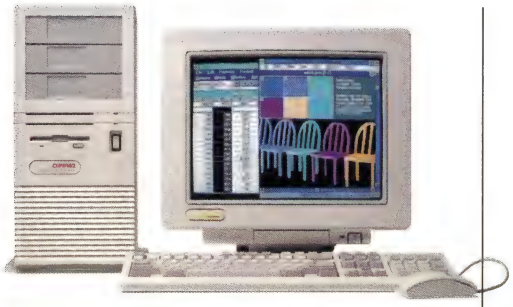

**Rated #1**
**Fluorescent Lighting**
**Passive NEC screen in Aspen's Aspenta 3600**




**Rated #2**
**Fluorescent Lighting**
**Active-matrix Sharp screen in Acer's AcerNote 780cx**

PEOPLE (2) CHIP SIMONS, COMPUTER SCREENS (6) JOHN GREENLEIGH

# YOU'RE LOOKING AT THE PRICE, PERFORMANCE,



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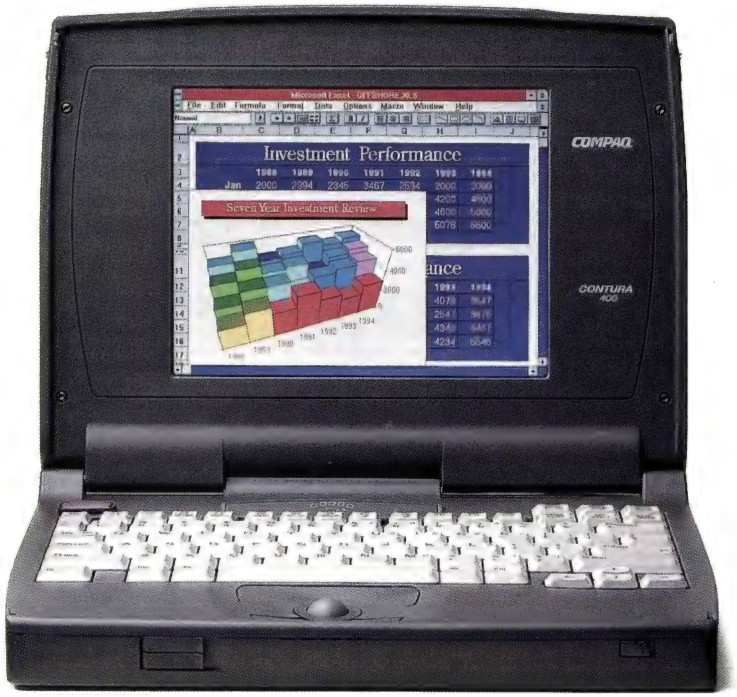


## *Compaq Contura 400C*

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We asked each person to start reading from an NEC MultiSync 4FGe desktop monitor as a baseline test, and then immediately follow with the four notebooks (each of which was disguised to hide any identifying marks). We attached an external keyboard so participants would not have to look away to find the <Page Down> key, and we rotated the order of the notebooks to prevent users from expecting the monitors in a certain order.

After completing each session, our well-read participants filled out questionnaires concerning eye-fatigue symptoms. We periodically (and unobtrusively) measured the distance from each person's eyes to the notebook screen to see if users adjusted the distance in relation to the strain on their eyes.

Our results were surprising. Although we did find differences among products, they didn't break down along the expected technological lines: Active-matrix screens did not always outperform the passive units. Under fluorescent light, our readers found that using the passive NEC screen resulted in the least eye fatigue; the next most readable screen was the active-matrix Sharp. Under incandescent light, our users experienced the least eye fatigue with the active-matrix Sharp, followed by the passive Sanyo screen.

What's the conclusion? The rankings from the taste test and the results of our readability/eye-fatigue test point to a conundrum: Active-matrix displays *look* impressive, but they may not always be easiest on the eyes for screen-intensive work. Much depends on the lighting situation.

## The Eyes Have It

For making presentations to a group, notebook screens are judged by a different set of preferences. In our presentation test, we assembled four sets of four users and asked them to evaluate both the effectiveness of a *PC World* marketing presentation created in Lotus Freelance Graphics *and* the screen on which we presented it.

Our participants viewed the presentation alternately on an NEC active-matrix screen and an NEC dual-scan passive display. Each group of viewers was positioned around the end of a conference table so that two were facing the notebook and the other two were on the sides at approximately a 60-degree angle. At the end of the presentation, the participants filled out questionnaires, which asked about the content of the presentation and posed subjective questions regarding the screen itself: brightness, color, screen size, and overall quality. We also asked the participants whether they would recommend each notebook for presentations.

The viewers' comprehension and retention of our presentation was the same whether they saw it on the active-matrix or passive screen, but most people said they preferred the active-matrix model. However, all users who sat at the sides of the table complained about the lack of brightness, resolution, and clarity regardless of which type of screen they viewed.

## Finding the Right Screen

With a range of prices and technologies available—and more on the way—how do you find the right screen for your notebook? If price is your main concern, go with a dual-scan passive screen: Our tests

# What's Going On Behind the Screens

The vivid color displays that make notebook screens so appealing are based on liquid crystals, a technology that has recently seen major innovations.

The first notebook liquid crystal displays (LCDs) were reflective monochrome, which used ambient light to illuminate the silverlike screen. In a poorly lit area, you almost needed a flashlight to read the screen.

Today's color screens are composed of color filters—a thin film of red, green, and blue blocks—sandwiched between the backlighting and the LCD panel. These filters are added to both active-matrix and passive color screens.

### Crystal Clear

Active-matrix generally have the highest-quality brightness, color depth, clarity, and responsiveness. Here, a thin film containing almost a million transistors is embedded in the LCD. Each color of each pixel has its own transistor, which holds the voltage at the required level. A fast-response liquid crystal material is used, allowing for the high responsiveness needed for real-time video images.

The drawbacks of this technology lie in its labor-intensive manufacturing process, which keeps supplies low and prices high. This dearth may change as new suppliers from Taiwan, South Korea, and the U.S. enter the market later this year.

Single-scan passive screen technology is the least expensive, but it has some pitfalls in quality. Instead of driving each color of each pixel separately, passive screens use a grid system, similar to strings of consecutively flashing Christmas tree lights. A *multiplexer* sends voltage through rows and columns to illuminate pixels at points of intersection. Problems can occur because the rows are activated one at a time in a cycle, and the liquid crystals of a particular pixel can "relax" before that row comes up again.

### Ghost in the Machine

The resulting blur of detail is called *ghosting*. Slower-response liquid crystal material is used to counteract the ghosting, but that means it's impossible to quickly refresh image data, so images such as real-time video lack clarity. While passive technology requires less power than active-matrix does, it often suffers in overall contrast and brightness and in visibility from the sides.

Urged by consumer needs, display manufacturers developed dual-scan passive technology, which divides the screen horizontally into two parts and adds a multiplexer; the single-scan process occurs on each half of the screen simultaneously. This dramatically improves the contrast ratio and color saturation of the passive screens. And because they cost 40 to 50 percent less than active-matrix screens while still offering decent image quality, dual-scan models have become a good alternative to the more expensive technology.

Since dual-scan passive displays are a resounding hit with consumers and aren't much more difficult or expensive to make than single-scan screens, most computer vendors are phasing out the latter. Nevertheless, dual-scan technology is not yet at the point where video—an essential component of multimedia—can be realistically shown.

show that the technology holds up, and the longer battery life of the passive models is a big plus, too. In fact, if you work mostly under the glare of fluorescent light, you may be doing your eyes a favor by choosing a passive display. And because these screens are difficult to read from side angles, they do provide an inadvertent form of security from roaming eyes.

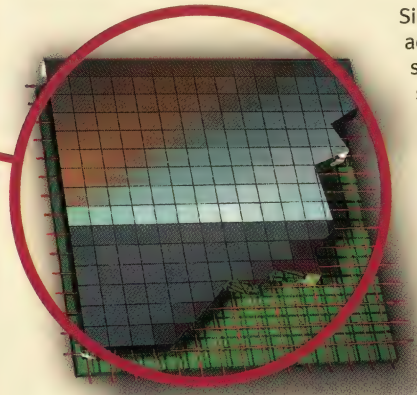
If you don't need to compromise on price, you should focus on where and how you'll use the notebook. If you plan to use it for presentations, our tests suggest that an active-matrix display will be more impressive to an audience (and in presentations, impressions can be *everything*). Don't assume, however, that buying an active-matrix model means you can crowd people around the screen: In reality, the wider viewing angle it offers doesn't seem to make much difference to the people viewing a presentation, particularly those on the sides.

If you'll be working for hours at a time on your notebook, a change in lighting conditions may be the most effective way to reduce eyestrain. But if you can't change your lighting, then going with a passive screen may help your eyes—and save you money at the same time.

Finally, choosing a notebook screen is not just a matter of comparing one technology with the other: All active-matrix screens are not the same, and neither are all passive displays. LCD screens are formed by sandwiching layers of components. Wedged in between

All LCDs are built basically the same way, but the method for illuminating their pixels varies. With passive screens, pixels fade before they're refreshed. Active-matrix pixels glow continuously.

**Single-Scan Passive**

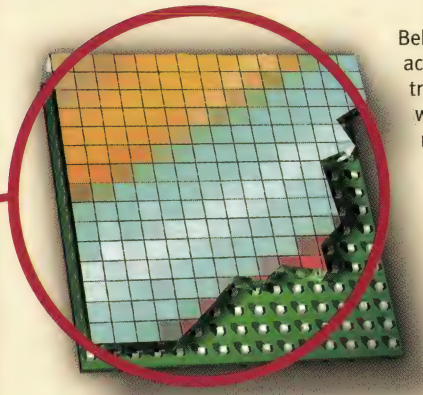


Single-scan display pixels are activated by an electronic signal from a multiplexer, a switchboard-like device that activates (refreshes) one row of pixels at a time, cycling sequentially from the top row to the bottom. Because the pixels fade between refreshes, cycle time must be fast enough to maintain acceptable image quality.

**Dual-Scan Passive**

Essentially, dual-scan screens work the same as single-scan ones, except the screen is split into top and bottom halves, each with its own multiplexer. Since each area has half as many rows to cycle through as a single-scan screen, the refresh cycle is twice as fast, and image quality is better.

**Active Matrix**



Behind each color of each active-matrix pixel is a transistor and a capacitor, which hold voltage at the required level. Pixels are refreshed before they fade, so the screen stays bright. Also, because the voltage controlling each pixel is more isolated from neighboring pixels than with multiplexing single- and dual-scan screens, contrast and image quality are higher.

JONAS HOGLUND

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**Circle 192 on reader service card**

the glass and the backing is the liquid crystal material, the multiplexer that activates the material, the color filter, and the backlighting. Each of these parts is manufactured separately and then assembled together later. No single component can be easily singled out as having the most impact on the quality of a screen—just as a deli sandwich is only as good as the sum of its ingredients.

Because notebook vendors continually change their flat-screen suppliers, there is no sure way to determine which vendor is using a particular manufacturer's screen. In fact, most notebook vendors shuffle the sources of their screens from one product line to the next, and from one year to the next.

In addition, the video subsystem of the notebooks can make a difference in viewing quality. Even the color and texture of a notebook's casing can affect how you perceive the quality of the screen it surrounds. But don't go just by first impressions. As our tests suggest, what uniformly seems better-looking at first glance isn't always best on the eyes.

Accordingly, you should audition each screen whenever possible by running your most frequently used applications on it. If you are purchasing by mail order, be prepared to return any unit that does not feel comfortable.

Above all, let your eyes be the final judge.

*Dean Andrews is manager of usability testing in the PC World Test Center. Kathleen Corrigan, Rose Cowden, Amanda Lewis, and Susan Silvius assisted in the usability testing.*

## The Aggressive Passive Upstarts

When the Pentagon discovered that the United States was almost totally dependent on Japan for flat-panel screens, the feds took steps to make the U.S. more self-sufficient with display technology and parts. The strategic command center for the federal effort to expand the flat-panel industry in this country is the U.S. Display Consortium (USDC), based in San Jose, California. This industry-led, public-private joint venture aims to provide the necessary direction and infrastructure.

While the feds view flat-panel displays as strategic defense tools, the private partners see the growing market and potential profits as a ripe business opportunity. How quickly will this move affect the consumer marketplace? Not very, say industry analysts. "The wrinkle is that [the Department of Defense] will spend money only on research and development because GATT rules don't allow investment in manufacturing," says Jon Englund of the American Electronics Association. So any technology developed with government investments is not expected to reach consumers for several years. "It's not going to translate to cheaper notebooks next year," says Englund.

A better hope for the U.S. consumer may be Motif, based in Wilsonville, Oregon. One of the upstarts in the U.S. display game, Motif is a joint venture of Motorola and In Focus Systems. While keeping an eye on the USDC, Motif is proceeding without government funding in its pursuit of a new screen display technology called *active addressing*.

Using an ASIC (application-specific integrated circuit) chip, active addressing runs image data through an algorithm that applies voltages to many rows of pixels simultaneously, instead of the one-row-at-a-time method of standard passive technology. This allows a much faster liquid crystal to be used, vastly increasing the screen refresh rate. It's still unknown how active addressing will affect battery life, but screens using this technology should use less power than active-matrix ones.

Keep it Clean: The process of making just one flat panel screen takes many quality control steps at Motif's clean room lab.

ROBBIE MCCLARAN/OUTLINE

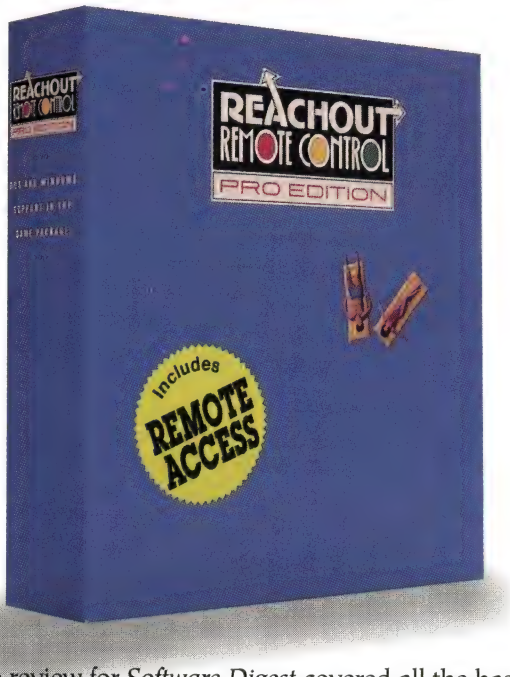
In terms of response time, contrast ratio, and price, screens with active addressing should fall between active-matrix and passive screens. Notebooks with Motif active-addressed screens will probably hit the market in early 1995, according to Paul Gulick, Motif's CEO and chief technology officer.

France's Pixel International is also aggressively leading an R&D effort that could have a great impact on the notebook market. Pixel is working on a screen design, called *field emission display* (FED), that puts a tiny color cathode-ray tube, similar to a TV tube, behind each pixel. FED screens should be brighter than LCD units, but they won't be available for a year or two.

Not all screen improvements come from new display technologies: Components such as backlighting and color filters are constantly redesigned and updated. Backlit screens, for example, are being engineered to produce brighter light with less power, and color filters have been developed that let more light through, making the screen brighter.

In addition, most display manufacturers are raising the standard for notebook screen resolution to match desktop resolutions of 800 by 600 and 1024 by 768. With more and more companies going into display manufacturing, expect rapid innovation and a greater variety of products in the near future. Meanwhile, researchers and engineers, including those at Xerox PARC in Palo Alto, California, are already playing with prototypes of the *Dick Tracy*–style TV watch and *Star Trek*–like minidisplay badges.

# Remote Control Software. Rated #1. Over and Over and Over...

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- #1 Overall Usability
- #1 Performance
- #1 Versatility
- #1 Ease of Learning
- #1 Ease of Use

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| ★★★ | 7.5 | Close-Up |
| ★★★ | 7.3 | Norton pcANYWHERE 1.0 for Windows |
| ★★★ | 7.3 | Carbon Copy for Windows |

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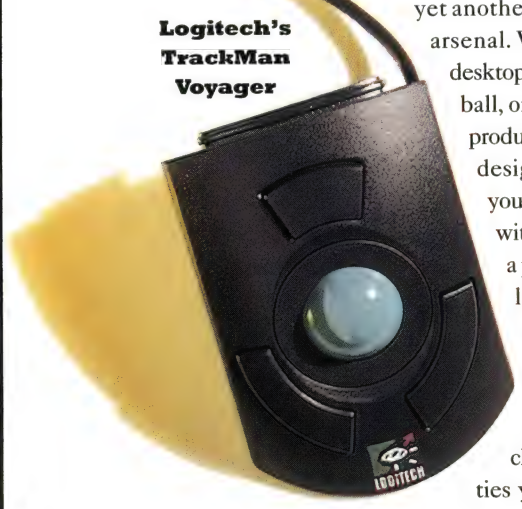
# POINTERS in the

**Feel like a contortionist when using quirky trackballs and other built-in pointing devices? You're not alone. Here's a guide to portable gizmos that work. By Gene Smarte**

Microsoft's BallPoint Mouse

If the pointing device on your notebook computer makes you feel as if you're all thumbs, take comfort: You're in good company. Most of these devices are a pain to use no matter what type they are—from ball to stick—or where they are located on the computer. Notebook vendors know this only too well. Each year they receive a sizable number of complaints and requests from users who want better-working built-in pointing devices. In fact, the number one service problem reported to many notebook vendors is trackballs that break down during normal use. Meanwhile, users are concluding that the best solution is to find an alternative to the integrated pointing device.

**Designed to Travel** Your first inclination may be to take your desktop mouse with you on your next business trip. But toting a desktop pointing device adds yet another piece of hardware to your mobile arsenal. While you can certainly attach any desktop pointing device—be it mouse, trackball, or joystick—to your notebook, these products carry the weight and bulk of items designed to traverse the vast steppes of your desktop. What you need is a pointer with the familiarity and ease of setup of a point-and-click unit, but compact and lightweight enough to go unnoticed with you on your travels.




Logitech's TrackMan Voyager

That's where we come in. We've assembled a list of 15 pointing devices designed for mobility. On the chart, note the customization capabilities you want in a pointer. While one or two buttons will be adequate for most software functions, some devices have additional buttons that you can program to perform often-repeated functions. Most portable mice and trackballs have base resolutions in the 200-to-400-dots-per-inch range—similar to those of desktop devices. But like desktop pointers, many of the

## Mobile PC Pointing Devices

| Manufacturer | Product | Product type |
|---|---|---|
| APT APPOINT, INC. 800/448-1184 | Gulliver<br>Thumbelina | mouse<br>trackball |
| AXELEN (U.S.A.), INC. 206/643-2781 | miniTrak | trackball |
| CIRQUE CORP. 800/454-3375 | GlidePoint | touch surface |
| DYNAPOINT, INC. 818/854-9355 | DynaTrak | trackball |
| INFO PRODUCTS 800/775-7576 | Info Track | trackball |
| INTERLINK ELECTRONICS 805/484-1331 | ProPoint[3] | sensor button |
| KRAFT SYSTEMS, INC. 619/724-7146 | uTrak | trackball |
| KYE INTERNATIONAL CORP. 800/456-7593 | HiPoint | trackball |
| LOGITECH, INC. 800/231-7717 | TrackMan Voyager<br>TrackMan Portable | trackball<br>trackball |
| MICROSOFT CORP. 800/426-9400 | BallPoint Mouse | trackball |
| MICROSPEED, INC. 800/232-7888 | MicroTrac | trackball |
| SIIG, INC. 510/657-8688 | Mouse Trax | mouse/trackball combination |
| XTEND MICRO PRODUCTS 800/232-9836 | SuperMouse 3-in-1 | sensor button |

n/a = not applicable [1] Limited lifetime. [2] Unlimited replacement.

# Right Direction

Cirque's GlidePoint

portable devices offer additional, higher resolutions.

All the pointers here connect through your computer's serial or mouse port. If you don't have a mouse port and your serial port is occupied, you can use a serial port add-on via any PCMCIA slot. Socket Communications (510/670-0300) offers Socket Serial I/O, a $199 RS-232 adapter card that gives your note a second serial port.

Cordless mice or trackballs seem like a logical solution for mobile computing. But consider this: You have to carry the pointer and its receiver—*and* batteries to power the receiver. Fortunately, some subnotebook vendors are working to integrate an infrared receiver into their units and to offer cordless portable pointers as options.

If possible, try out any potential candidate on your notebook, testing the product for ease of use, ease of mounting, and clicking ergonomics. Practice using the pointer before you take that big presentation on the road. Try the simulated airplane flight test: Sit in a small, awkward chair, place your notebook on a TV-dinner table, and play with the pointer. Does it feel comfortable? If it does, you're pointed in the right direction.

**Best Bets** Three favorite pointers among *PC World*'s editors are Logitech's TrackMan Voyager, Microsoft's BallPoint Mouse, and Cirque's GlidePoint. The Logitech and Microsoft devices are trackballs; Cirque's is a touch-surface pointer that lets you click and drag by tapping the surface of its pad.

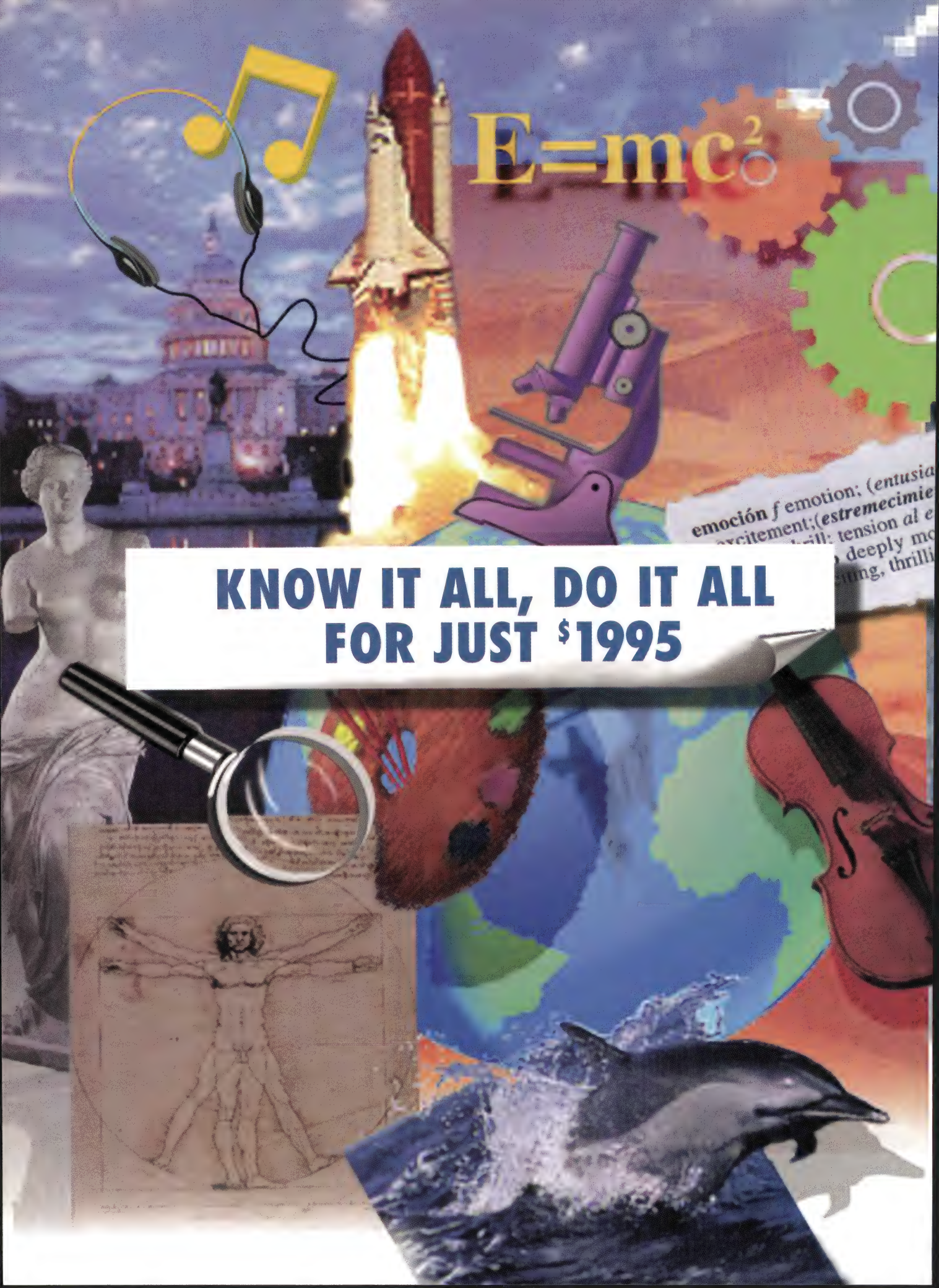
*Gene Smarte is the editor of* PC Graphics & Video.

| Price | Ergonomic features | Number of buttons | Ball/button diameter (inches) | Base resolution (dpi) | Dynamic acceleration | Warranty (years) | Reader service no. |
|---|---|---|---|---|---|---|---|
| $69 | minisize | 2 | n/a | 250 | yes | 1[1] | 601 |
| $69 | drag-lock button | 2 | .375 | 150 | n/a | 1[1] | 601 |
| $89 | ambidextrous, clip-on mount | 4 | .875 | 200 | n/a | 1 | 602 |
| $99 | click and drag by tapping surface | 2 | n/a | speed dependent | adjustable | 2[1] | 603 |
| $69 | ambidextrous, clip-on mount | 2 | 1 | 400 | n/a | 1[1] | 604 |
| $49 | ambidextrous, hand-held | 3 | 1.25 | 200 | n/a | 5[2] | 605 |
| $129 | hand-held | 2 | 1 | pressure dependent | pressure dependent | 1 | 606 |
| $89.95 | ambidextrous, clip-on mount | 2 | 1.18 | 80 | yes | 1 | 607 |
| $69.95 | ambidextrous, clip-on mount | 2 | 1 | 400 | yes | lifetime[2] | 608 |
| $89.95 | ambidextrous, clip-on mount | 3 | .75 | 250 | yes | 3[1] | 609 |
| $69.95 | | 2 | 1 | 200 | yes | 3[1] | 609 |
| $85 | ambidextrous, clip-on mount | 3 | 1.1 | 400 | yes | 1[1] | 610 |
| $89.95 | 2- and 3-button versions, mounting bracket | 3 | .75 | 400 | yes | 1 | 611 |
| $69 | flip over to change from mouse to trackball | 2 or 3 | .875 | 300 | yes | 1[1] | 612 |
| $79.95 | ambidextrous, desk mount | 2 | 1 | pressure dependent | pressure dependent | 1 | 613 |

[3] Comes with 6-foot cord plus 6-foot extension cord.

**For more information about all products in this table, circle reader service no. 901.**

JOHN GREENLEIGH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excitement;(estremecimie
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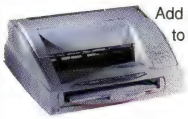

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# Here's How

Contents: Spreadsheets 267 | Word Processing 270 | Windows 276

HELP LINE Q & A

## Tip of the Month

**MAKING THE CONNECTION: MS-DOS 6.*x*'s Interlnk utility links two PCs so that one computer (the client) can access the programs, data, and printers on the other (the server). The PCs must be connected between their parallel ports with a male-to-male cable, or between their serial ports with a female-to-female cable. The server must have the program INTERSVR.EXE and the client must have INTERLNK.EXE.**

**On the client, add the line DEVICE=C:\DOS\INTERLNK.EXE to the CONFIG.SYS file, making sure its LASTDRIVE statement includes enough drive letters to accommodate the drives on the server, and reboot the system. On the server, enter the command INTERSVR. On the client, enter the command INTERLNK. When connected, the server's drives appear as additional drives on the client. Note that the server is unable to do any other work while you access its resources.**

**Interlnk is not very smart; by default, it loads all its code into memory. So if you're not planning to use the server's printer, you can save some memory by adding the /NOPRINTER switch. Interlnk has other switches that you can check out by typing HELP INTERLNK.EXE at the DOS prompt.**

**Steve Bass, Contributing Editor**

### Difficult Defrag

**Q** I have three questions about DOS's Defrag utility. Sometimes when I run it, I notice that the "unmoveable" files (shown on the screen map of my hard disk as *X*'s) have moved around since the previous run. Is this okay? Also, after I run Defrag, the display usually shows that my disk is only 97 percent unfragmented. Why can't I get it up to 100 percent? And finally, when I switched to DOS 6.2, the upgrade program created a directory that it named OLDDOS.1 and moved many of the old version's files into it. I deleted that directory and ran Defrag. Even though my disk wasn't badly fragmented, the utility took a long time to run. Why?

*Jean-Maurice Fortier,*
*Ile-des-Soeurs, Quebec, Canada*

**A** When Defrag runs, it avoids moving files with special attributes such as hidden, system, and read-only. This precaution prevents Defrag from mucking up copy-protection schemes, which often depend on the physical location of a file on the disk. However, other programs can move these files (since they know it's okay to do so); hence the wandering *X*'s. If you know you're not using copy-protected software, you may want to run Defrag with the /H option, which lets it move hidden files.

Don't sweat it if you can't get the disk 100 percent defragged. Usually, it's the files represented by those *X*'s (or other files in the vicinity) that are fragmented. There's not much Defrag can do about this situation, but performance won't suffer significantly.

Regarding your final question, it's not uncommon for Defrag to take a long time to reorganize a hard disk even though its files are not very fragmented. Let's assume that just one file is in pieces scattered all over the disk, and all the others are contiguous. Defrag can gather the pieces of that one file very quickly, but it must work for quite a while to reposition the rest so no blank areas remain between the files. If you want to save time, you can make Defrag run faster by adding the /U option to the end of the command line. With this option, Defrag makes files contiguous but doesn't remove the space between them. (Note, however, that the next new files you save will be fragmented to fill in those empty spaces before they're put in the free space at the end of the disk.)

By the way, Defrag is a stripped-down version of the Norton Utilities' SpeedDisk (published by Symantec). Since the Norton program is faster and offers some optimization methods that Defrag doesn't, you may want to buy it.

### Blasting Beeps

**Q** How can I control the volume of the beeps that come from my PC's speaker? I believe you've addressed this within the past year.

*Michael G. McCormick,*
*Glen Oaks, New York*

**A** In the November 1993 *Help Line*, we described a command that lets you control the volume on a modem's speaker. However, the hardware and software that produce the warning beeps you hear on an ordinary PC are very primitive. There's no true volume control, and the sound level depends on the motherboard, the type of speaker used, and the design of the PC's case.

ROBERT NEUBECKER

If you'd like to control the volume of the beeps coming from your computer, you do have a few choices. If you're running Windows, you can use the PC Speaker Driver (see *Star-Dot-Star*, December 1993) to make your PC's speaker produce other, possibly quieter, sounds instead of beeps. And some PC sound cards allow you to route the signal destined for the PC's speaker into the sound card's audio system instead—in which case you should be able to use the card's mixer controls to adjust the volume. Another option, of course, is to insert a volume control rheostat into the speaker line and mount its knob on the outside of your PC.

### Pincushion Problem

**Q** The picture on my monitor is bowed on the sides. Is there a way to correct this by adjusting the monitor? The problem is most obvious when I'm in Windows.
*Dale E. Miller, Pittsburgh*

**A** The problem you're seeing is sometimes called pincushioning, because it makes the normally rectangular image on your monitor look more like a pillow or pincushion. Usually, it's due to a misadjusted monitor, a failing monitor power supply, or a video card pumping out a signal with too much resolution for the monitor to handle.

To determine what you should do, try running your display at a lower resolution in Windows (say, 640 by 480 instead of 800 by 600). Also, try slowing down the refresh rate on your video card (you can usually set this using jumpers or software). If the problem goes away, your video card was sending the monitor a signal that required its electron beam to scan faster than it really could. In this case, unless you replace the monitor you'll have to live with a lower refresh rate or resolution.

If the picture is distorted at all resolutions and refresh rates, the monitor requires internal adjustments or a new power supply. Don't go poking around inside the monitor yourself; charges of 35,000 volts or more may be present on internal components, even when the unit is turned off or unplugged. Have a competent technician check the monitor to see if it can be fixed.

### A Proper Turn-On

**Q** I turn on my PC as recommended by the manufacturer—first the monitor, then the computer—and reverse the process to turn it off. I recently purchased an uninterruptable power supply (UPS). Do I still need to follow these steps, or can I plug the monitor and computer into the UPS and turn on everything with one flick of the switch?
*Rolando Monserrat, Bergenfield, New Jersey*

**A** System vendors advise users to turn on the monitor before the computer to avoid a problem that occurs with some video cards: Unless the monitor is already on, the card may "think" the display is monochrome rather than color. Test your system to see if this is the case: If it boots to DOS in color when you turn everything on at once, you can use the main switch on the UPS to control the whole system.

### A Proper Turn-Off

**Q** Our office has several PCs running Lotus 1-2-3 release 3.0 under DOS 5.0. One by one, they are running out of disk space. Apparently, swap files with names like ABAADDGCC are accumulating in the 123R3 directory. Since each file takes up half a megabyte, we'll soon run out of room altogether.

Our corporate software guru could not explain why this was happening, and it doesn't happen on all our systems. Can you explain it?
*Gary Wojda, Batavia, Illinois*

**A** From the sound of it, your problems have more to do with the habits of your users than hardware or software. If you turn off a machine without exiting the application you are running and then exiting DOSSHELL, either the application or DOSSHELL (or both)

USER GROUP OF THE MONTH

## North Texas PC Users Group

**November's user group tips are supplied by the North Texas PC Users Group, which holds its all-day meeting on the third Saturday of each month at the Dallas Infomart. The organization hosts more than 60 special interest groups, including ones for Visual Basic, programming, spreadsheets, the Internet, hardware, and MS-DOS. The group's newsletter provides SIG reports, the Disk of the Month (among other shareware offers), the User-to-User listing of resource volunteers, and software reviews. The group maintains a 1GB library of shareware, public domain software, and freeware, available at the meetings.**

**For more information, contact Andy Oliver, president, at P.O. Box 780066, Dallas, TX 75378-0066, or call 214/746-4699 for a recording. The group's BBS number is 214/387-2751. Membership costs $24 a year ($16 for students) and includes the monthly newsletter and access to the SIGs and BBS.**

**Reader service no. 625**

**COMPUSERVE'S INTERNET GATEWAY: CompuServe users can send E-mail to users on other online services. To send a message to a Prodigy user, for example, type the address in the format >INTERNET:*ID*@PRODIGY.COM, inserting the recipient's Prodigy ID after the colon. To send mail to America Online recipients, type >INTERNET:*AOL Name*@AOL.COM. To send mail to someone on the Internet, type >INTERNET: followed by the person's address.**

**Andy Oliver**
**North Texas PC Users Group**

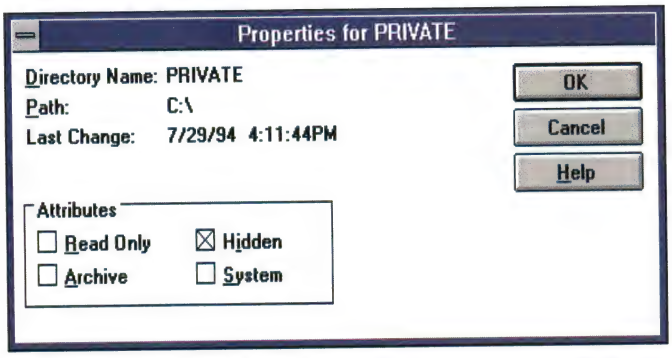



**FIGURE 1: YOU CAN HIDE A DIRECTORY in Windows by checking Hidden in the directory's Properties dialog box in File Manager.**

may leave temporary files on your hard disk. When you power down in midsession, the software has no opportunity to clean up after itself, so useless temporary files stay on your disk. (Go ahead and delete those files from your disks.)

Train your personnel to shut down properly—that is, by exiting the application and then exiting DOSSHELL to return to the DOS prompt. Then, for extra safety, have them press **<Ctrl>-<Alt>-<Delete>** and wait for the beep before turning off the power. If everyone follows this procedure, the mysterious files will no longer appear.

### Hide and Seek

**Q** I know that DOS lets you hide a file, but can you hide a whole directory? If so, how? I also use Windows; can I hide a directory there as well?
*IM 4X4 Bob, America Online*

**A** Yes, you can hide a whole directory (that is, prevent its name from appearing when the parent directory is listed) in either DOS or Windows. In DOS, use the ATTRIB command with the +H option to hide the directory, and the same command with the -H option to unhide it. To hide a directory called \PRIVATE, for example, you would enter the command **ATTRIB +H \PRIVATE** at the DOS prompt. One word of caution: Don't be fooled into thinking that a hidden directory is secure. The DOS command DIR \/A:H/S will reveal the names and locations of every hidden file on your disk.

In Windows, you can hide and unhide directories in File Mangler (oops, I mean File Manager) as follows. Select the name of the directory (not the files in it, but the directory itself) in any File Manager view. Then select *File•Properties* from the main menu or press **<Alt>-<Enter>** to bring up the dialog box that controls file attributes (see **FIGURE 1**). Check the *Hidden* check box to hide the directory.

If the directory name doesn't disappear, you need to tell File Manager to stop revealing hidden files: Select *View•By File Type* and uncheck *Show System/Hidden Files*. Remember, anyone can check this box to reveal hidden files and directories; and anyone who knows the name of the directory can use File•Search to find it, hidden or not.

### Is SCSI Scuzzier Than IDE?

**Q** I'm buying a new 90-MHz Pentium PC. I wanted to buy a 1GB SCSI drive, but the salesperson insisted the new 1GB "Enhanced IDE" drives were better. He said they run faster because they have a 32-bit data path. What's the true story?
*Waynewendy, America Online*

**A** While IDE drives have made big strides in performance, they are still no faster than good SCSI drives. The SCSI interface can handle more data per second than any hard drive can transfer, so the limiting factor is not the interface but the drive itself. SCSI also has some real advantages in areas other than speed. Because SCSI is a bus that can handle up to seven devices besides the host computer, the SCSI adapter can also run a CD-ROM drive, a tape backup unit, a scanner, and other peripherals. This saves motherboard slots and makes configuration much easier, especially on a multimedia system—no more fussing with conflicts between boards for interrupt request lines, DMA channels, and other system resources. And because SCSI works with any computer, SCSI devices have a broader market and a higher resale value.

### Failing Formats

**Q** My PC runs DOS 6.2 and Windows 3.11. The hard drive is compressed with Stacker 3.1 for Windows and DOS, and I am using QEMM 7 and PC-Kwik. When I attempt to format a floppy disk using File Manager, the formatting process runs almost to the end but then stops, and I get an error message saying the disk is write protected. But the disks are not write protected. What's the deal? Does this error message reflect an incompatibility between Stacker and Windows 3.11?
*Sam Hoyle, Mount Pleasant, Michigan*

**A** Since Stacker doesn't compress freshly formatted floppy disks by default, it won't cause problems during formatting. However, another program you're using—PC-Kwik—can cause formatting problems if it is set to cache the floppy drive. On fast machines, some versions of PC-Kwik try to ask the floppy whether it is write protected but then don't wait long enough for the hardware to respond. (This is what computer engineers call a *race condition*.) As a result, the software reports that the floppy is write protected when it really isn't. To get around this problem, enter PC-Kwik's configuration program and select *Standard support* instead of 'Advanced support' for the floppy drive.

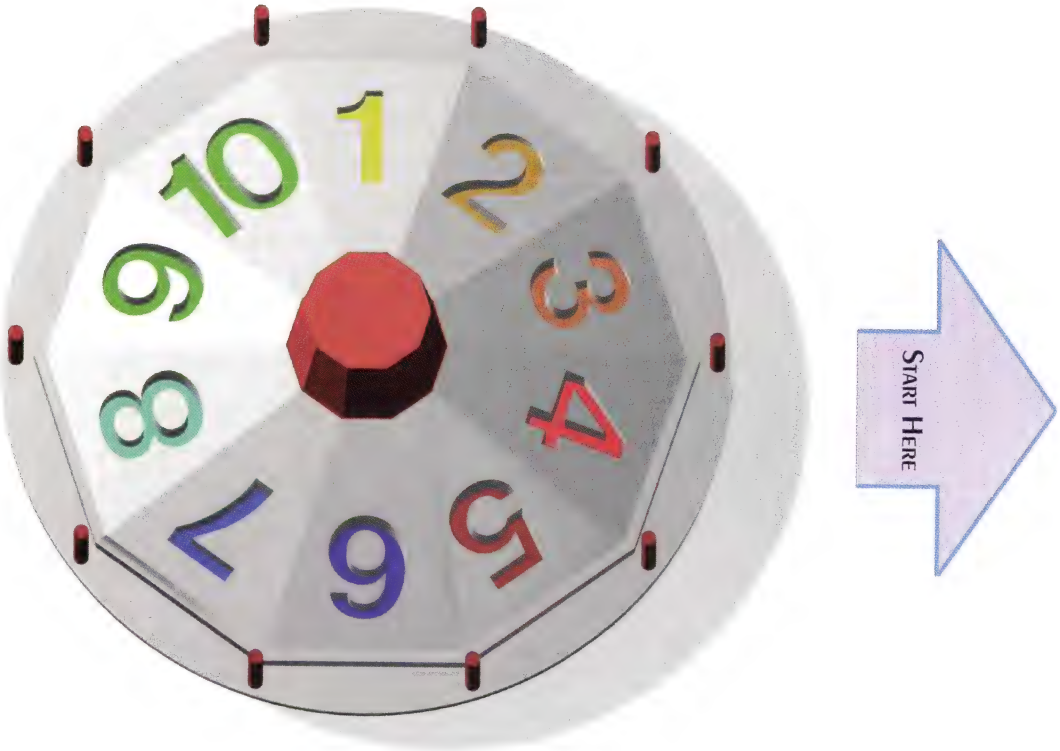
PC-Kwik isn't the only program that sometimes causes problems with floppy formatting. The "cloaked" cache in Helix's NetRoom and Multimedia Cloaking packages often refuses to write to the boot sector of a disk during formatting. To get around this feature, which appears to have been designed to prevent viruses from infecting floppy disks, you must turn off floppy disk caching. Some BIOSes also have an antiviral setting, which warns of writes to the boot sectors of floppies, but you may not be able to format a disk under Windows with this feature turned on.

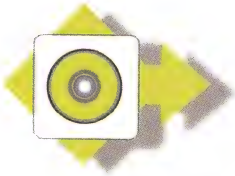
**By Brett Glass**

*Brett Glass is a contributing editor for* PC World. Help Line *welcomes your questions (refer to page 12 for contact information).*

# Are You Game?

## Playing to Win With Quantex



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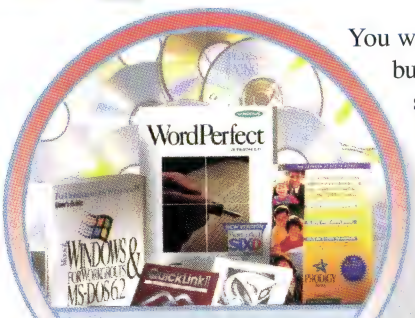


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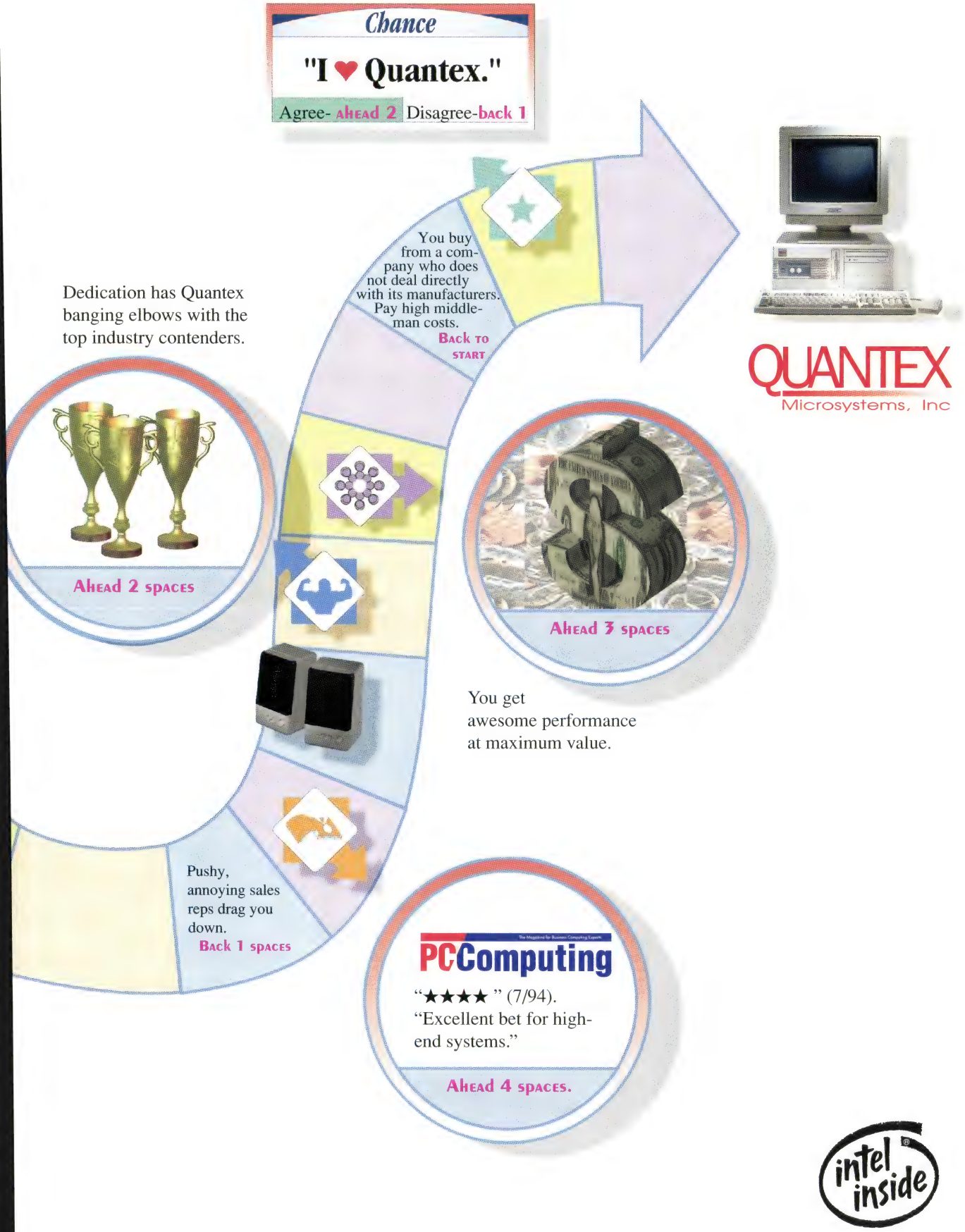
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RELIABILITY AND SERVICE MONITOR

# Win a Zeos Pantera DX4-100

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win a Zeos Pantera DX4-100, a Best Buy featured in this month's PC World Top 20.

**HOW TO ENTER:** Fax your completed questionnaire to *PC World* at 415/974-7367. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 11-SS, *PC World*, 501 Second St. #600, San Francisco, CA 94107-1496. Send your survey in no later than November 30.

**HOW TO FILL OUT THE FORM:** Clearly print your name (use block capital letters) and your fax number at right; fill the appropriate circle for each digit of your daytime phone number. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES! One entry per person per month. Void where prohibited by law.

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| 2 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 3 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 4 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 5 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 6 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
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## ABOUT YOUR PC

**Who is the manufacturer of the PC you use most frequently?**

○ Acer ○ Acma ○ ALR ○ Ambra ○ Apple ○ Ares (MI) ○ AST ○ AT&T (NCR) ○ Austin ○ Blackship ○ Canon
○ Compaq ○ CompuAdd ○ Compudyne ○ Comtrade ○ Cornell ○ DEC ○ Dell ○ Diamond ○ DTK ○ Eltech ○ EPS
○ Epson ○ Everex ○ Future Tech ○ Gateway 2000 ○ Hewlett-Packard ○ Hyundai ○ IBM ○ Insight ○ Leading Edge ○ Micro Express ○ Micron
○ MIS ○ Mitac ○ NEC ○ Packard Bell ○ Panasonic ○ Pionex ○ Polywell ○ Quantex ○ Samsung ○ Sharp ○ Swan
○ Tandy ○ Tangent ○ Texas Instruments ○ Toshiba ○ Tri-Star ○ Twinhead ○ USA Flex ○ VTech (Expotech, Laser) ○ Zenith (ZDS) ○ Zeos ○ Other

**Is this PC a...?**
○ Desktop
○ Notebook/laptop
○ Hand-held

**Is the CPU a...?**
○ PowerPC
○ Pentium
○ 80486
○ 80386
○ Other

**Where did you buy this PC?**
○ Local dealer
○ Mail/phone order
○ Direct from field sales force
○ Membership discount store
○ Computer superstore
○ Home electronics store
○ Retail store
○ VAR
○ Other

**After ordering, how long did it take to get your PC?**
○ Less than 1 week
○ 1–2 weeks
○ 3–4 weeks
○ More than 4 weeks

**Who set up your PC?**
○ Dealer/retailer/VAR
○ Staff computer technician
○ Self or co-worker

## WHEN YOU FIRST GOT YOUR PC

**When did you buy this PC? (Specify month and year.)**

○ Jan ○ Mar ○ May ○ July ○ Sept ○ Nov ○ 89 ○ 91 ○ 93
○ Feb ○ Apr ○ June ○ Aug ○ Oct ○ Dec ○ 90 ○ 92 ○ 94

**When you first set up your PC, were any components "dead on arrival" (DOA)?**
○ Yes ○ No ○ Don't know

**If so, which component was it? (Mark all that apply.)**
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

**Did your problem occur only after adding your own hardware or software?**
○ Yes ○ No ○ Don't know

**Would you buy this brand of PC again?**
○ Yes ○ No ○ Not sure

**How many times have you had a problem with this PC?**
○ No problem ever ○ One ○ Two ○ Three ○ Four ○ More than four

**If you have had a problem that you have not reported in a previous survey, please fill out the section at right. If you are reporting a DOA for the first time, skip to the service section.**

## NEW PROBLEM REPORT

**Please answer for the most recent problem—*other than DOA*—not reported in a previous survey.**

**When did this problem occur? (Specify month and year.)**

○ Jan ○ Mar ○ May ○ July ○ Sept ○ Nov ○ 89 ○ 91 ○ 93
○ Feb ○ Apr ○ June ○ Aug ○ Oct ○ Dec ○ 90 ○ 92 ○ 94

**How long was this after you purchased your PC?**
○ Less than 1 month ○ 1–3 months ○ 4–6 months ○ 7–12 months ○ More than 12 months ○ Not sure

**Did the problem occur as a result of adding new hardware or software?**
○ Yes ○ No ○ Don't know

**Did the problem occur under warranty?**
○ Yes ○ No ○ Don't know

**What was the problem finally identified as? (Mark all that apply.)**
○ Faulty component ○ Incorrectly installed software ○ Wrong configuration ○ Faulty peripheral ○ Device conflicts ○ OS problem ○ Other ○ Don't know

**If a component failed, which one was it? (Mark all that apply.)**
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

## SERVICE

**Please use this section to describe the service and support you received for the problem reported above or the DOA reported at left.**

**Who fixed your PC?**
○ Manufacturer
○ Dealer/store where purchased
○ Manufacturer's authorized repair technician
○ Self ○ Other

**What types of service and support did you receive? (Mark all that apply.)**
○ Phone ○ On-site ○ In-store help
○ System swap ○ Component swap ○ Factory return

**If you received phone service, how long were you on hold?**
○ Not at all ○ Less than 1 minute ○ 1–2 minutes ○ 3–5 minutes ○ 6–10 minutes ○ 11–20 minutes ○ More than 20 minutes

**How long did it take before you talked to the person who finally helped you?**
○ Less than 15 min. ○ 15 min.–1 hr. ○ 2–5 hr. ○ 6–10 hr. ○ 11–24 hr. ○ 1½–2 days ○ 3–5 days ○ 1 week or more

**How long did it take to resolve the problem completely?**
○ 1–2 days ○ 3–7 days ○ 1½–4 weeks ○ More than 1 month ○ Never resolved ○ Awaiting resolution

**Was the problem resolved to your satisfaction?**
○ Yes ○ No

**Please rate the person(s) who helped you on the following (on a scale of 1 to 5):**

| | Poor | | Good | | Excellent |
|---|---|---|---|---|---|
| Courtesy | ○ | ○ | ○ | ○ | ○ |
| Knowledge | ○ | ○ | ○ | ○ | ○ |
| Follow-through | ○ | ○ | ○ | ○ | ○ |

**Based on the service and support you received, would you buy this brand of PC again?**
○ Yes ○ No

**On the whole, how satisfied are you with the service and support you received?**
○ 1 Not at all ○ 2 ○ 3 Satisfied ○ 4 ○ 5 Extremely satisfied

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( ) - 

| | | | |
|---|---|---|---|
| 1 | ○○○ | ○○○ | ○○○○ |
| 2 | ○○○ | ○○○ | ○○○○ |
| 3 | ○○○ | ○○○ | ○○○○ |
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| 5 | ○○○ | ○○○ | ○○○○ |
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| 9 | ○○○ | ○○○ | ○○○○ |
| 0 | ○○○ | ○○○ | ○○○○ |

Your credit card #

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| | | | | |
|---|---|---|---|---|
| 1 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 2 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 3 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 4 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 5 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 6 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 7 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 8 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 9 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |
| 0 | ○○○○ | ○○○○ | ○○○○ | ○○○○ |

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## SPREADSHEETS Q & A

### Running 1-2-3 Release 3.x Under Windows

**Q** I run 1-2-3 release 3.1 under Windows in Enhanced mode, and I launch it using a PIF file. My PC has 8MB of RAM, and the command /Worksheet•Status shows me that I have 540,498 bytes of free memory out of 1,040,908 bytes. My big worksheets need more than that, so I used the Windows PIF editor to set the XMS memory to 4096K. I thought this trick would allocate 4MB to 1-2-3 (I learned about this from a friend who uses 1-2-3 release 2.4). But now when I launch 1-2-3, the /Worksheet•Status command still shows just 1MB. How can I make Windows give 1-2-3 more memory?
*Alston Reddy, Marysville, Montana*

**A** You and your friend are wrestling very different animals. While it's true that changing the PIF memory requirement can allocate more memory to 1-2-3 release 2.*x*, release 3.*x* requires a different approach. Open your AUTOEXEC.BAT file (from Program Manager, select *File•Run*, type **SYSEDIT**, and press **<Enter>**) and add the line **SET1-2-3 MEMSIZE=4096**, making sure not to put spaces around the equal sign. Save the file and reboot your PC. The next time you launch 1-2-3, you'll have 4MB of RAM available. Note, however, that this tip works only for Windows in Enhanced mode.

### In Any Spreadsheet: The Number of Months Between Two Dates

**Q** I need a formula to calculate the number of months between two dates. Can you help?
*Judy Hoeferlin, Forest Park, Ohio*

**A** Folks who use Quattro Pro for Windows or 1-2-3 release 4.0 have special calendar functions to make these kinds of calculations simple (I'll get to them in a minute). But users of DOS spreadsheets (including Quattro Pro and 1-2-3 releases 2.*x* and 3.*x*) or Excel have to work harder. Here's a formula that will do the trick for all these programs except Excel: **@IF(***end***>***start***,@NA,@SUM((@YEAR(***end***)−@YEAR(***start***))*12,@MONTH(***end***)−@MONTH(***start***),@DAY(***end***)>=@DAY(***start***),−1))**, where *start* is the range name or cell address of the starting date, and *end* is the range name or cell address of the ending date.

For Excel, use **=IF(***end***>***start***,NA(),SUM((YEAR(***end***)YEAR(***start***))*12,MONTH(***end***)−MONTH(***start***),DAY(***end***)>=DAY(***start***),−1))**.

It works like this: @YEAR(*end*)–@YEAR(*start*))*12 takes the number of years between dates and converts that figure to months. @MONTH(*end*)–@MONTH(*start*) calculates the difference in the month numbers between the dates. (This number can be negative when *start* occurs in a later month than *end*.) @DAY(*end*)>=@DAY(*start*) adds one month when *end* falls on the same day or a later day of the month than *start*. The @SUM function adds them all up and subtracts one to make the calculations come out right, and the @IF function displays the error value 'NA' if *end* is earlier than *start*.

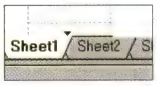
1-2-3 release 4.0 users get a break. The formula **@IF(A2<A1,@NA,@DATEDIF(A1,A2,"m"))** gives the same results as above. Note that the third argument—"m"—stands for "month."

Quattro Pro 5.0 for Windows users should use **@MNTHS(***start, end***)**.

### Assembling an Excel 5.0 Workbook From 4.0 Files

**Q** I recently upgraded from Excel 4.0 to 5.0 and have a set of related worksheets (one for each salesperson in our office) that I'd like to combine into one multipage Excel 5.0 workbook. What's the best way to accomplish this?
*Carlotta Westfield, Interlachen, Oregon*

**A** You can simply use your mouse to drag and drop your old worksheets into a new workbook. Try it: In Excel 5.0, use *File•New* to create a new workbook. Then choose *File•Open*, select the first 4.0 worksheet, and hold down **<Ctrl>** while you select all the other 4.0 files you want to combine into your 5.0 workbook. Once the files are loaded, choose *Window•Arrange*, make sure *Tiled* is selected in the dialog box, and click *OK*. The Excel 4.0 files and the blank Excel 5.0 workbook should now appear on the screen. Put the mouse pointer on the sheet tab of one of the 4.0 worksheets, hold down the mouse button, and drag the pointer into the new workbook. (As you move the mouse, a small black triangle appears between the sheet tabs to indicate where the sheet will be inserted.) Release the mouse button, and Excel moves the sheet into your new workbook. Because the old document no longer contains any sheets, Excel closes its window. You can repeat the process to incorporate the other Excel 4.0 documents into your new workbook.




Note that Excel 5.0 assigns the 4.0 file names to the new worksheets. To change a sheet's name, double-click its tab and enter a descriptive name.

To remove blank sheets from the new document, click the tab of a sheet you want to delete, then hold down **<Ctrl>** and click the tabs of any other sheets you want to delete. Then right-click any of the selected (nongray) sheet tabs and select *Delete* and then *OK* from the resulting pop-up menus.

### Linked Formulas in Quattro Pro for DOS

**Q** I use Quattro Pro 4.0 for engineering design. I've set up a worksheet to hold reference data on many types of beams, and I have several template worksheets that use the beam data in calculations. I enter the beam type and use @VLOOKUP formulas to retrieve the beam's properties from the data worksheet. A typical formula might be @VLOOKUP(B3,[BEAMDATA]A:A3..A:D7,1), where cell B3 contains the beam type, BEAMDATA is the data file, A:A3..A:D7 is the range that holds the beam data, and 1 denotes the second column of the table, which contains the weights of the beams.

# Master Class: Finding Corrupted Formulas

**As any spreadsheet user knows, detecting wrong answers in a complex application can rattle your sense of well-being. One common cause of errors occurs when you inadvertently enter a number into a formula cell or move a cell that the formula depends on for its calculation. In this Master Class, I'll discuss a technique that instantly detects such errors.**

**One of your duties as head teamster for the Plodhorst Delivery Service is to track vehicle use. You employ a complex spreadsheet—a simplified version of which is shown in FIGURE 1. (I've used Excel 5.0 for this demo, but the strategy works in any spreadsheet.) You keep data for each city on separate sheets in your workbook. The tables vary in size, but they all have the general form shown in Figure 1: Every week, you enter the mileage for each vehicle, and SUM formulas in column F and row 14 add up the miles. The table contains an almost invisible error—a corrupted formula in cell F5. The SUM function has been accidentally replaced by '7265', as shown.**

**Now notice the grand total in cell F14, which I've given the range name RaleighTotal. Instead of a simple SUM function (which would have added up the corrupted value), this formula uses a cross-checking technique to find the error: =IF(ABS(SUM(F3:F13)−SUM(B14:E14))>0.001,NA(),SUM(F3:F13)). The first SUM function calculates the grand total by adding up row totals; the second SUM calculates the same total by adding up column totals. The formula then subtracts the two sums, and if the absolute value of the difference is greater than .001, the IF function returns the error function NA. Otherwise, it returns the sum of the row totals. The value #N/A in cell F14 signals an incorrect row or column total in the tables.**

**Subtracting the two totals works better than comparing them. For example, if you had used SUM(F3:F13)<>SUM(B14:E14) as the first argument of the IF function, you could see #N/A by mistake, due to tiny rounding errors inherent in all spreadsheet calculations.**

**Because the workbook contains mileage tables for many different cities, I've included a verification page (FIGURE 2) that lets you check all the totals in the entire workbook at a single glance. The check formulas in C6:C9 are simple references to the verification formulas located on each sheet; for example, the formula in C6 is =VERIFY.XLS!RaleighTotal. If the Raleigh grand total is okay, this formula displays its value, like the others shown. But if it detects an error, the #N/A value is carried onto the verification sheet.**

**As a final step, you could include a grand checksum formula like the one shown in cell C3: =IF(ISNA(SUM(C6:C9)),"Error In Formula!","OK"). This adds up all the check formulas, then uses the ISNA function to detect an error in any of them. If it finds an error (that is, if the value is #N/A), the formula displays the message shown; otherwise, it displays 'OK'. Now, imagine a print macro that refuses to produce a report unless ISNA(SUM(C6:C9)) is false ...**

RaleighTotal =IF(ABS(SUM(F3:F13)-SUM(B14:E14))>0.001, NA(),SUM(F3:F13))

| | A | B | | | | |
|---|---|---|---|---|---|---|
| 1 | Raleigh | | | | | |
| 2 | Vehicle | Week 1 | Week 2 | Week 3 | Week 4 | Total |
| 3 | 1 | 1,063 | 1,252 | 1,117 | 1,105 | 4,537 |
| 4 | 2 | 1,665 | 1,057 | 1,780 | 1,250 | 5,752 |
| 5 | 3 | 1,978 | 1,634 | 1,828 | 1,914 | 7,265 |
| 6 | 4 | 1,343 | 1,782 | 1,811 | 1,789 | 6,725 |
| 7 | 5 | 1,275 | 1,271 | 1,171 | 1,647 | 5,364 |
| 8 | 6 | 1,098 | 1,573 | 1,171 | 1,065 | 4,907 |
| 9 | 7 | 1,533 | 1,741 | 1,656 | 1,217 | 6,147 |
| 10 | 8 | 1,480 | 1,118 | 1,570 | 1,641 | 5,809 |
| 11 | 9 | 1,746 | 1,767 | 1,760 | 1,137 | 6,410 |
| 12 | 10 | 1,102 | 1,729 | 1,879 | 1,818 | 6,528 |
| 13 | 11 | 1,881 | 1,580 | 1,271 | 1,489 | 6,221 |
| 14 | Total | 16,164 | 16,504 | 17,014 | 16,072 | #N/A |
| 15 | | | | | | |

Raleigh / Durham / Green

*FIGURE 1: DETECT CORRUPTED FORMULAS anywhere in the table with the verification formula shown in cell F14, which uses a cross-footing technique.*

C3 =IF(ISNA(SUM(C6:C9)),"Error In Formula!", "OK")

| | A | B |
|---|---|---|
| 1 | Formula Verification | |
| 2 | | |
| 3 | Check Sum | Error In Formula! |
| 4 | | |
| 5 | Check Formulas | |
| 6 | Raleigh | #N/A |
| 7 | Durham | 124,567 |
| 8 | Greensboro | 12,432 |
| 9 | Wilmington | 234,123 |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |

The value #N/A in one of the cells indicates that a formula on that worksheet is corrupted.

Wilmington / VERIFY

*FIGURE 2: USE THIS VERIFICATION SHEET to track your workbook's verification formulas. The checksum formula in cell C3 displays an error message if a formula has been corrupted.*

Here's my problem: When I add a new type of beam to the data sheet, it changes the address of the table where the beam data is stored; when I open a template later, the lookup formulas still incorrectly refer to the old range. Is there a way to make the lookup formulas readjust automatically?

*Burrell Fisher, Little Falls, New York*

A Simple: Use a range name. In the data file, use the command *Edit•Names•Create* to assign the range name BEAMS to the range A:A3..A:D7. Then modify the formula in the template file to read **@VLOOKUP(B3,[BEAMDATA]BEAMS,1)**. When you insert or delete beam types at the start or end of the list, reset the range name to properly cover the table; when you open the templates, the formulas will refer to the correct range.

**By Richard Scoville**

*Richard Scoville is a contributing editor for* PC World *and a software training consultant in Chapel Hill, North Carolina.* Spreadsheets *welcomes your questions (see page 12 for contact information).*

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## WORD PROCESSING Q & A

### Wrapping Text in WinWord 6.0

**Q** I recently switched from Ami Pro 3.01 to Word for Windows 6.0a. The most common type of document I create is a three-column newsletter. WinWord handles the job well, except for one snag: When I insert a frame for a graphics image into the left-hand column and then stretch it about halfway into the next, the text in that second column doesn't wrap around the frame. I checked, and I definitely have text wrapping turned on. If I make the frame a bit narrower, or move it to the left, the text wraps just fine. I didn't have this problem with Ami Pro, which would happily wrap text no matter how wide I made the graphics frame. What can I do to fix this problem?
*Walter L. West,*
*Charleston, South Carolina*

**A** Interesting question. It turns out that Word for Windows will only wrap text around a graphics frame that's more than 1 inch from a column boundary or page margin. Get any closer than that and WinWord won't wrap. So I'm afraid the solution is to make sure your column-spanning frames are at least an inch away from those boundaries or margins. Either that or return to using Ami Pro, which has no such limitation.

### Pleadings in WordPerfect 6.0a for Windows

**Q** As an attorney, I have to write pleadings in a strict format, with line numbers and other fixed layout elements. Just recently, I moved from WordPerfect 5.1 for DOS to WordPerfect 6.0a for Windows. In the old DOS version, I could access a built-in pleading style by pressing <Alt>-<F8>. Now, I can't seem to find this option in the Windows version. Can you help?
*Anthony Cummings, Oakland*

**A** The Windows version of WordPerfect uses templates rather than styles for different types of documents. To use the pleading template in version 6.0a, select *File•Template.* Choose *pleading* in the Document Template to Use list, then click *OK.* You'll see a standard pleading document on screen. If you need to make modifications to the template, just click the *Pleading* button (it appears in the Button Bar whenever you load this template) and change the necessary settings in the Pleading Options dialog box.

### Cleaning Up Word for Windows

**Q** Is there any way to get rid of the logo that pops up when you start WinWord 2.0? I'd also like to eliminate the document summary dialog box that appears every time I save a document.
*Mehran Hossaini,*
*Forest Hills, New York*

**A** I can't help you with the logo. Despite all my efforts I couldn't find a way to disable it. Besides, when the logo is on screen, WinWord is going through an obligatory series of start-up procedures, so you wouldn't save any time even if you could nix the logo.

You *can* get rid of the document summary dialog box. When you installed WinWord 2.0, it configured itself to prompt you for document summary information the first time you save a file. To change that, select *Tools•Options* and click the *Save* icon in the Options dialog box. Then uncheck the *Prompt for Summary Info* check box and click *OK.* This setting becomes the new default.

By the way, WinWord 6.0 users can follow a similar procedure to suppress the document information dialog box: Select *Tools•Options•Save,* then uncheck *Prompt for Summary Info.*

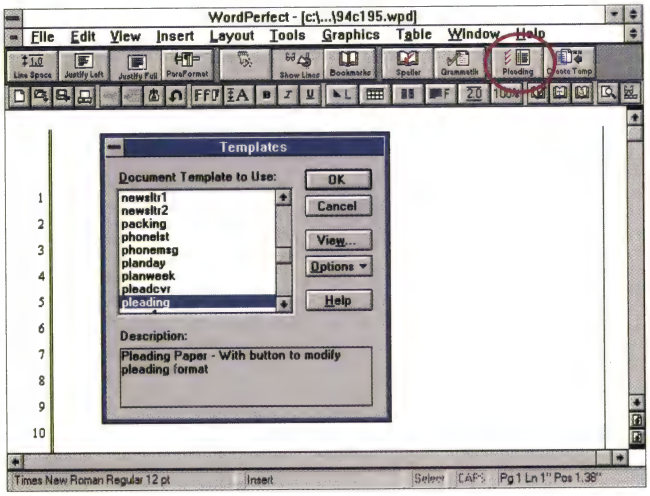


**FIGURE 1: LEGAL PLEADINGS IN WORDPERFECT FOR WINDOWS 6.0A are easy with the pleading template; to customize the template, just click the Pleading button (circled).**

USER GROUP TIP

### The WordPerfect Date, With Style

**In a WordPerfect for DOS document, insert today's date at the cursor by pressing <Shift>-<F5>1. To select a different format for the date, press <Shift>-<F5>3. In WordPerfect 6.0 for Windows, select Insert • Date • Date Text to insert the date, and Insert • Date • Date Format to select a different date format. In WordPerfect 5.1 and 5.2 for Windows, the respective commands are Tools • Date • Text and Tools • Date • Format.**

**Lori Quinn**
**North Texas PC Users Group**

### Creating Multipage Booklets in Ami Pro

**Q** I'm trying to create booklets using Ami Pro 3.01 but am having a heck of a time doing it. I'm printing the booklets on regular letter-size paper in landscape orientation, with two pages side-by-side on each sheet and a fold down the middle. To get the pagination correct, I need to print pages 1 and 8 on one side of a sheet, pages 2 and 7 on the other, and so forth. How do I print the pages so they're in the right order when I fold and staple them together?
*Jim Hoffer, St. Joseph, Michigan*

# Do You Make These Six Common Mistakes On Your Taxes?

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**3 The Omitted Form**
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**4 The Misinterpreted Instruction**
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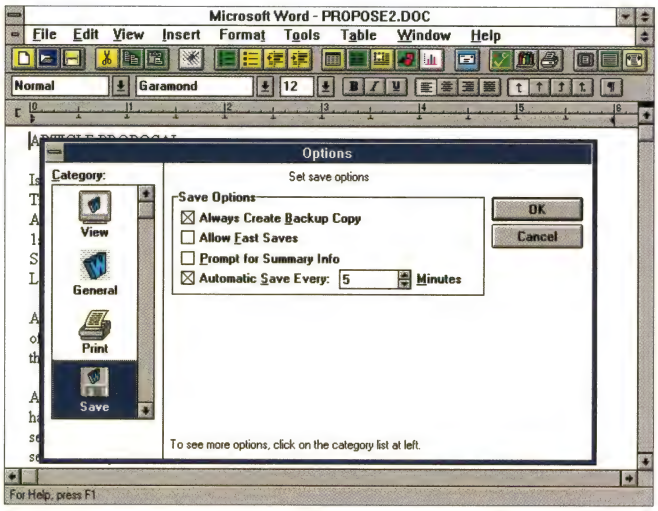


**MAKE FASTER GETAWAYS FROM WINWORD 2.0 by telling it not to prompt you for document summary information.**

A Creating folded booklets can be a daunting job, but there are ways to simplify it. You can switch to WordPerfect 6.*x* and its automatic booklet-making feature. Or you can try ClickBook, which transforms any document into a booklet but doesn't let you edit layouts after they've been formatted.

- **ClickBook** $69.95; BookMaker Corp.; 415/354-8161
  **Reader service no. 751**

If switching applications or buying a utility seems like more trouble than it's worth, you can still do the job in Ami Pro, but the procedure won't be automatic. The trick is to create two documents: one for writing and editing, the other for laying out the pages in printing order. The instructions here are specific to Ami Pro, but the same basic techniques work in any word processor.

1. Start by formatting the editing document. Select *Page•Modify Page Layout*, then select *Page settings*. Under Orientation, choose *Landscape*. Select *Margins and columns* and specify two columns with a 1-inch gutter between them. Set all page margins to 0.5 inch. You can make the margins wider; just be sure your gutter is twice as wide as the margins.

2. When you're done formatting the editing document, go ahead and create your booklet's text, graphics, and other elements. Don't worry about page order at this point—you'll handle that later.

3. Once the document has all the elements you want, check its page count at the bottom of the Ami Pro screen. Divide this number by two. Take that many sheets of blank paper, put them together, and fold them as you will your booklet. Write page numbers on the blank sheets to use as a reference later.

4. Now, without closing this first document, create a second one for layout. Follow the instructions in step 1 to specify the same orientation, column, margin, and gutter settings as the first document. Give this layout template the same number of pages as the editing document by inserting page breaks (*Page•Breaks•Insert page break*). Press **<Ctrl>-<Home>** to return to the top of this second file you've created. For the rest of the steps it's easiest to work in a full-page view, so select *View•Full Page*.

5. Now here's the trick that makes this all work: Create two frames on each page of the layout template that exactly fit the areas bounded by the margins and gutters. To do this, select *Frame•Create Frame*. In the subsequent dialog box, set the frame's size and position. In this case, using an 8½-by-11 sheet of paper with ½-inch margins and a 1-inch gutter, each frame would be 4½ inches wide by 7½ inches high. The left-hand frame on each page would be ½ inch in from the left and down from the top, and the right-hand frame would be 6 inches in from the left and ½ inch down from the top.

6. After inserting the two frames, right-click each one in turn to bring up the Modify Frame Layout dialog box, then select *Size & position*. Next, set the frame margins to 0 on all sides by pressing the *Clear Margins* button. If necessary, select the *Lines & shadows* option and remove any border lines and drop shadows from the frame. Finally, create a small frame for a page number inside each larger frame. Add the numbers manually, using your folded sample booklet as a guide. Repeat this procedure for all subsequent pages in the booklet.

7. All of this takes some time and attention to detail, so if you plan to create booklets with the same layout and number of pages in the future, save your empty layout now as a style sheet for future use. To do this, select *Style•Save as a Style Sheet*, fill in a file name, and check the *With contents* check box. If you'll be making booklets with different layouts or numbers of pages, create complete style sheets for each booklet, since pagination will vary with the number of pages.

8. The rest of the job is fairly easy. Both documents should still be open and set to display in full-page mode. Move from the layout template to the working document by pressing **<Ctrl>-<Tab>**. Highlight all the text in the first column of the first page, then press **<Ctrl>-C** to copy it to the Clipboard. Switch to the layout document, make sure the frame for the first page is selected, and press **<Ctrl>-V** to paste the text. If you've included graphics or other elements, copy and paste them separately into the appropriate pages. As you work, check each frame's page number before pasting to be sure you're on the right page. Repeat this process until you've pasted every column's text into the appropriate frame.

9. Save the final layout, then switch to a normal or even an enlarged view to check the document before printing. If your printer handles duplex printing, you can print the booklets in one pass. Otherwise, check your blank booklet to determine the page order, print the one side, flip the paper and then reinsert it in your printer and print the other side.

This process may seem complex at first, but it gives you complete control over the creation of your booklets, and it goes quickly once you've set up the templates.

**By George Campbell**

*George Campbell is a contributing editor for* PC World. *He can be reached on PC World Online as PCW George (see page 12 for contact information).*

If you've ever had hardware problems, file system problems, or even DOS problems, you know that Norton Utilities® is a lifesaver. But we figured it was time to make a great thing even better. And look what happened. InfoWorld gave Norton Utilities a 9.4 out of 10 on its Desktop Utilities Report Card. Suddenly we were teacher's pet. Other members of the press were equally complimentary. Statements surfaced like "the ultimate toolkit for DOS and Windows." And "Norton's new Windows Utilities can assure safer and more reliable computing than anything else on the market." Not something we would just come out and say about ourselves. But Byte and PC Magazine sure did.

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It's safety and convenience. Which is reassuring when you're in that ever familiar panic mode.

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*Norton Utilities received a 9.4 out of 10 on its Desktop Utilities Report Card in the May 9, 1994 issue of* InfoWorld.

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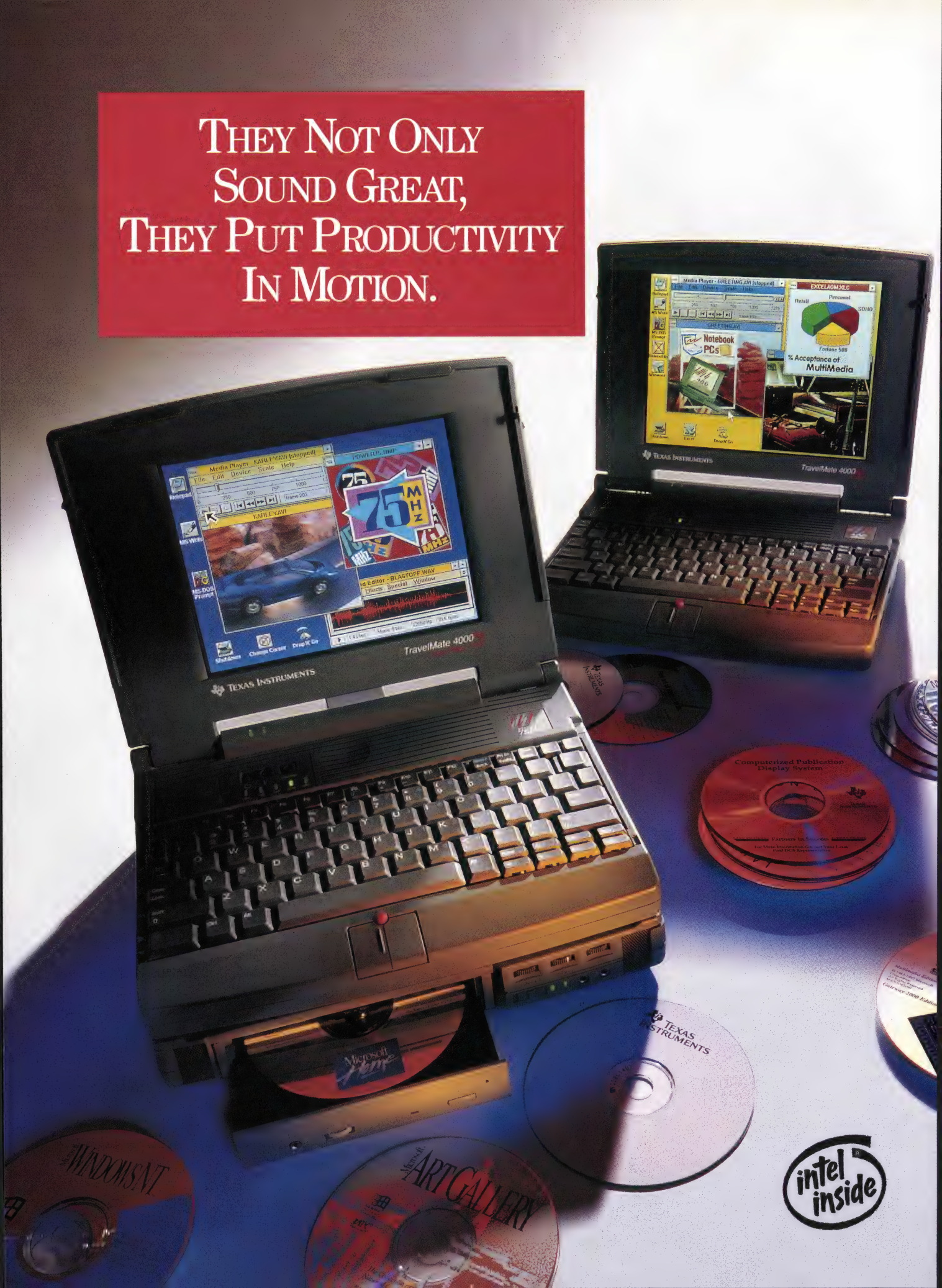

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WINDOWS Q & A

### Scan of a Different Color

**Q** I want to add color to a scanned black-and-white drawing. But when I load the file in Paintbrush, the palette is black and white, and I can't change it to color. Is there any way to do this?
*Jim Shephard, Brecksville, Ohio*

**A** You can't change the color palette when an image is already in Paintbrush, but you can change the palette before you import your drawing. First, start Paintbrush—without loading an image—and select *Options•Image Attributes*. Specify the dimensions you want the image to have, make sure *Colors* is selected in the Colors section, and click *OK*. Then choose *Edit•Paste From*, select the name of your file, and click *OK*. Click any tool in the tool area to complete the paste. You can now add all the colors you want. Because you've created a new, untitled picture, you'll have to give it a file name when you save it.

Note that if the image goes nearly to the edges of the picture size you specified, you'll need to choose *View•Zoom Out* before pasting it, then choose *View•Zoom In* afterward to return to normal view. Happy painting.

### Monitoring the Swap File

**Q** I've seen utilities that monitor system resources, and others that keep track of disk caches. Is there a similar utility available that will let me monitor my Windows swap file? I'd like to see how much the file gets used.
*Russ Collins, Lawrenceville, Georgia*

**A** I don't know of any program that's specifically designed to monitor swap file use, but you can keep track of it yourself with the help of any memory monitor—including the one built into the Help menu of virtually every Windows application and accessory.

To see what I mean, choose *Help•About* from File Manager or Program Manager. The amount of free memory listed in the About window is your available RAM, including that allocated to your permanent swap file. If the amount of available RAM is greater than the size of your swap file, then you aren't using the swap file yet.

For example, if you have 8MB of RAM and a 12MB swap file, and Help•About says you have 15MB free, you're using 5MB of RAM and you've still got 3MB to go before you start tapping into the swap file. However, if the amount of available RAM is smaller than the size of your swap file, you know that you've used up all your RAM and have started to bite into the swap file.

Another way to spot swap file use is simply by observing your system. When your swap file is being used a lot, you'll notice that operations slow down appreciably, and your hard drive's light flashes frequently.

### Seeing the Invisible

**Q** I selected a directory in File Manager and used the File•Properties command to hide it. Now I can't select it to unhide it. How do I make my directory visible again?
*John R. Chambers, Bolingbrook, Illinois*

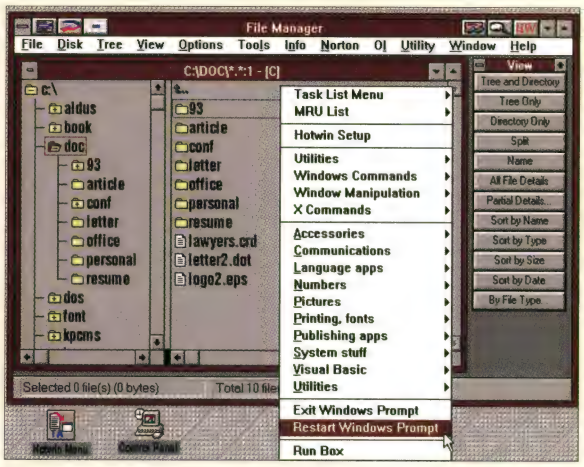
**A** Yikes! Watching a whole directory disappear can be an alarming experience, but fortunately the directory is not as invisible as you may think. In File Manager, simply choose *View•By File Type*, check the *Show Hidden/System Files* box, and click *OK*. Your directory should then be visible again. (If it's not, press **<F5>** to refresh the window.) Now select the directory and choose *File•Properties* (or press **<Alt>-<Enter>**) to open the Properties dialog box. Uncheck the *Hidden* box and click *OK*. Finally, to get File Manager back to normal, choose *View•By File Type* again, uncheck *Show Hidden/System Files*, and click *OK*.

### Decorating the Desktop

**Q** I really like screen savers. My only complaint is that I see them only when I'm not using the mouse or keyboard. Isn't there a way to see a screen saver while I work?
*Gordon Samuelson, Chicago*

**A** Unless you like working in slow motion, running animations while you work is not a great idea on anything

## Windows Toolbox

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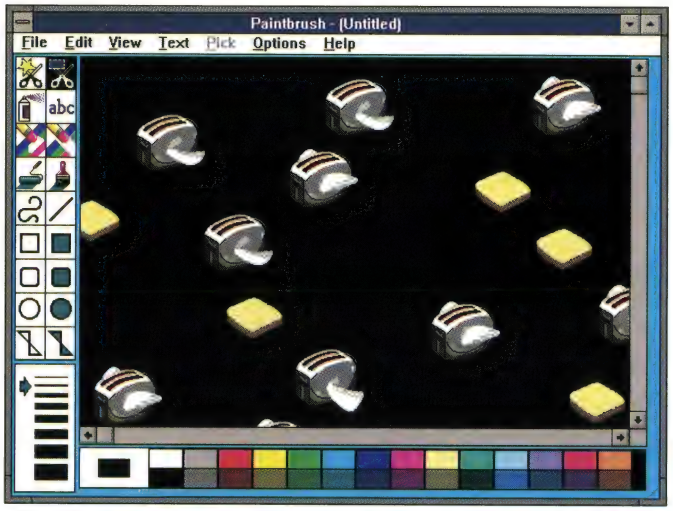


**TURN YOUR SCREEN SAVER INTO WINDOWS WALLPAPER by pressing <Print Screen> and pasting the image into Windows Paintbrush.**

but the fastest machines. That's because animations consume vast quantities of system resources.

If you simply want to see specific images from your screen saver, you can save system resources by using those images as wallpaper. Just run the screen saver module of your choice, and when the image you like appears on screen, press the **<Print Screen>** key. Then open up Windows Paintbrush and choose *Options•Image Attributes*. Select *Pels* for units, type in your screen resolution in the width and height boxes—640 (width) by 480 (height) for VGA resolution, 800 by 600 for super-VGA, and so on—and click *OK*. Choose *View•Zoom Out*, then press **<Shift>-<Insert>** to paste the image into Paintbrush. To complete the paste operation, click any tool on the tool bar. Finally, choose *View•Zoom In* and save the file in BMP format. To assign the image as your wallpaper, use the Desktop icon in Control Panel.

This technique works best on screen savers that use the standard 16 colors; those using 256 colors may not carry the proper color palette into Paintbrush when you paste. In that event, you can still use the <Print Screen> technique to copy the image, but you'll need a screen capture program that captures images from the Clipboard. My favorite example: ImagePals Screen Capture.

If you want to run animated screen savers behind open windows, you'll have to buy a product like Express Systems FirstApps or Crystal Walls. FirstApps is actually a collection of 20-odd utilities of varying utility, one of which runs After Dark screen savers on your desktop while you work. Crystal Walls, on the other hand, runs *only* animations on your desktop, from Sharpei puppies that turn their heads when you click on the desktop to a photo-realistic NASA module hovering over a moonscape. In addition to running 18 of its own screen savers, Crystal Walls also lets you play Intermission screen savers. Happily, the program slows or stops when you start working.

- **Crystal Walls** $50; Domain Virtual Worlds, Inc.; 800/896-7537
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  **Reader service no. 622**
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### Moving the Task List

**Q** I frequently use the Task List to shut down applications that are taking up memory, but I wish it didn't always pop up in the middle of my screen. Is there some way I can make the Task List window appear somewhere else?
*Denise Culver, Vienna, Virginia*

**A** The <Ctrl>-<Esc> keyboard shortcut always opens the Task List in the center of the screen, but if you're willing to mouse around, you can have it pop up wherever you want. Double-clicking on the Windows desktop brings up the Task Manager near the spot you clicked. If your desktop is too cluttered with windows and icons for you to use that method, click any program's control button and choose *Switch To*. In this case, the Task List will appear near the control menu location (the upper left corner of the screen for maximized applications). If you want the Task List to sit lower on the screen, try the same thing with the control menu of a minimized application icon at the bottom of your screen: Just click its icon and choose *Switch To*.

### Automatic Backups

**Q** Before I switched to Windows, I started most of my DOS applications from a batch file. When I exited the application, the batch file used the XCOPY /M command to automatically save any altered data files to a floppy disk. Is there an equivalent procedure I can use with Windows? DOS batch files don't work: When I try to start the Windows application, I get the message 'This program must be run under Microsoft Windows'.
*Steve Bygrave, CompuServe*

**A** You can use a similar technique by creating a batch file that starts Windows and issues your DOS backup commands. Just create a text file containing the following lines, altering the lines as necessary for your applications and hard drive structure:

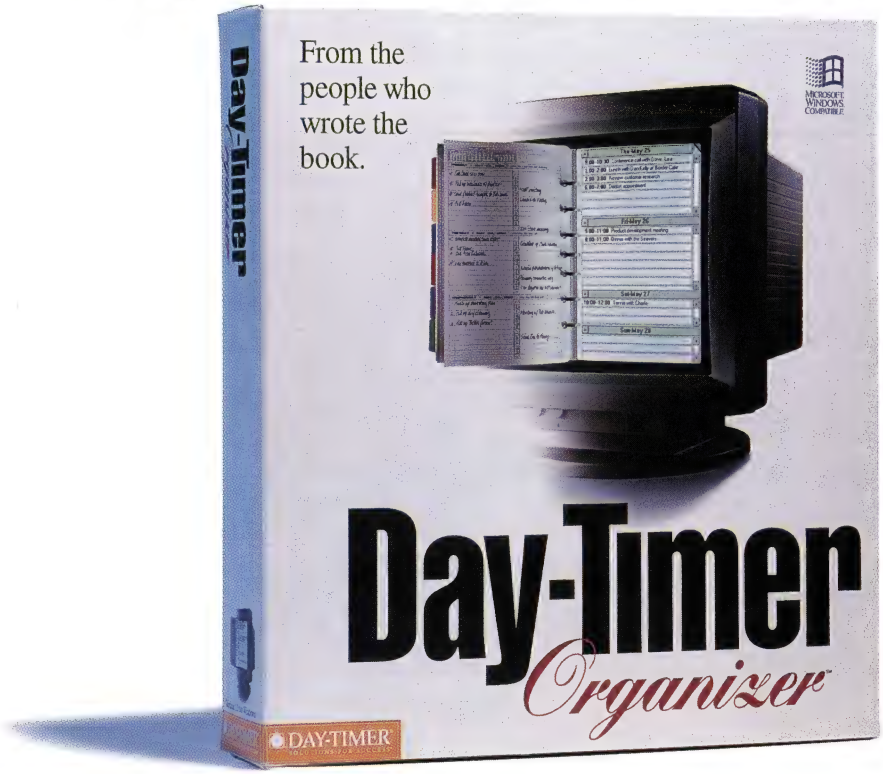
```
WIN
XCOPY C:\path\ *.DOC A: /M
XCOPY C:\path\ *.WK1 A: /M
```

Be sure to include all the directories and extensions you use for your data files. If you use this batch file to start Windows, it will make backups whenever you exit Windows. The only limitation to this approach: It won't select files for backup based on the programs you used during a given Windows session. Instead, it will back up every altered file in every specified directory every time you exit Windows. This isn't too serious, though, because XCOPY /M only backs up files you didn't back up previously.

**By Scott Dunn**

*Scott Dunn is a contributing editor for* PC World *and coauthor of* 101 Windows Tips and Tricks *(Peachpit Press, Berkeley, California, 1992).* Windows Q&A *welcomes your questions (see page 12 for contact information).*

# Only One Company Could Fit 47 Years Of Time Management Experience On A Disk.

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## DATA MANAGEMENT Q & A

### One-Click Copies in Paradox for Windows

**Q** I use Paradox for Windows to keep records on all sorts of information. When I'm doing data entry, I often need to enter groups of records that are identical except for one or two fields—maybe only the date or an expense code. I'm looking for a way to copy a record quickly so I can edit only the fields unique to that record.
*John Davids, San Francisco*

**A** The trick is to use a data entry form with a button on it that, when clicked, will make a copy of the current record. Here's how:

First, if you don't already have a data entry form, make one. The quick and easy way is to open the table and click the Quick Form icon. You won't get anything fancy, but Paradox will make a nice, simple form to which you can add a push button without too much trouble.

With the form open, select *Form•Design* and click the Button tool. Then point to an empty spot on the form and drag to create a button big enough to contain the text 'Copy Record'. Double-click the word *LABEL* on the button, then enter the text **Copy Record** to replace it.

Once you've labeled the button, you must add a few lines of ObjectPAL code to tell it what to do. Select the button by clicking its edge—this should make handles appear around the button—and press **<Ctrl>-<Space>** to open its Methods dialog box. Double-click *pushButton* in the Built-in Methods section and edit the listing in the next dialog box so it looks like **FIGURE 1**. Before you close the box and save the code, click the Check Syntax button to make sure that you have entered everything correctly.

That's all you have to do. Once you're back in the data entry form, you can test the new button. First, press **<F8>** or click the View Data button to enter edit mode. Then go to a record you want to copy, click anywhere on the record, and click your new Copy Record button. Paradox will insert a copy of the selected record into the form.

```
method pushButton(var eventInfo Event)

var
  recCopy Array[] String
endVar

;make sure you are in edit mode
action(DataBeginEdit)

; copy the current record to an array
copyToArray(recCopy)

;add a new blank record
;after the current record
InsertAfterRecord()

; copy values in array to new record
copyFromArray(recCopy)

endmethod
```

**FIGURE 1: COPY RECORDS EASILY by adding these instructions to a push button in a Paradox for Windows data entry form.**

### Unsorted Answers to Paradox Queries

**Q** Whenever I perform a query in Paradox 4.5 for DOS, the resulting ANSWER table is sorted by the first field, then the second, and so on. But that's not what I want. I need to see the ANSWER records in the same order they appear in the original table. Is there a way to do this?
*Debbie Jones-Boletti, Denver*

**A** When you select fields with <F6> while creating a query, Paradox returns only unique records to the ANSWER table, which the program sorts as you have described. Fortunately, there's an easy way to turn off the sorting: Select your fields with **<Alt>-<F6>** instead of <F6>; this puts a Check Plus in your query fields, rather than the regular Check. In addition, the command instructs Paradox to include duplicate records in the ANSWER table and not to sort the table.

### To Import or to Attach With Access?

**Q** I just got Access 2.0, and I'd like to incorporate some existing Paradox data into my Access database. Should I import the Paradox table into Access, or "attach" it to an Access database? What are the advantages of each approach?
*Ashley Monroe, Dallas*

**A** As you've discovered, there are two ways to work with foreign data types in Access: importing the data into an existing Access database, or attaching it to the database. If you need to share your data with someone who's still using Paradox, you'll want to attach it. If you're not sharing data, importing it gives you more freedom to work with it. Here are the details:

When you use File•Import and select a Paradox table, Access copies the file as a table within your Access database. The original Paradox data remains untouched and won't reflect any changes you make with Access.

This approach has some real advantages: You can rechristen your tables, giving them more-descriptive names than the eight characters allowed by Paradox (whose tables are DOS files, with all of DOS's naming limitations). You can also modify a table's structure—changing field names, adding fields, and so on. On the other hand, Access doesn't copy everything about the Paradox table; you will have to re-identify the key fields manually and re-create any validation rules for governing what data can go into a field.

When you use File•Attach Table in order to attach a Paradox table to an Access database, the information stays in the Paradox table. You can view the data, edit it, and even link it to Access tables, but it's not actually stored in Access. Because the attached data remains in its original form, Paradox users can still access it, so you can see their

changes and they can see yours. Access respects key fields in an attached Paradox table but ignores validation rules and won't let you change an attached table's structure.

### dBASE IV Upgrade Error Message

**Q** When I upgraded from dBASE III Plus to dBASE IV version 2.0, a simple program I wrote developed an annoying quirk. Now whenever I start to edit a record, I get the irritating prompt 'Record may have been changed (press SPACE)'. How can I get rid of this message?

*Peg Ackerson, Hanover, New Hampshire*

**A** The message is part of dBASE's system for letting people share data across a network. dBASE lets several people open a file at the same time, but only one can change a particular record. When dBASE asks you to press the <Space> bar, it is getting ready to lock out other users from that record so you can make your changes.

If you don't need to worry about sharing your files with anyone else, add an EXCLUSIVE parameter to your program's USE command—the one that opens your data file. The command should look something like **USE** *database* **EXCLUSIVE**, where *database* is the name of your DBF file.

Another option is to turn EXCLUSIVE on as dBASE's default. To do this, go to the DOS prompt in your dBASE program directory and enter **DBSETUP**. This brings up dBASE's configuration program. Select *Config.db•Modify existing CONFIG.DB*, and press **<Enter>** when you're prompted for a file name. On the next screen, highlight *Database•Exclusive* and tap **<Space>** to toggle it to ON. Select *Exit•Save and exit*, press **<Enter>** again at the configuration file name prompt, and tell DBSETUP to overwrite the existing file. Finally, use *Exit•Exit to DOS* to save your changes. That annoying message will disappear for good.

### Personal Style for Approach Layouts

**Q** I find Approach 2.1 very easy to use, but I can't stand the look of its default forms. I find myself spending a lot of time changing fonts and colors in my fields and labels. I also have to change the settings for the frames that appear around fields and other details. Is there some way to change the default form attributes?

*Judd Mitchell, Atlanta*

**A** You can give all your new Approach forms and reports a personal look through the Options dialog box. To get there, open up any form and select *Style•Options*. You'll notice four sections in the resulting dialog box: Default Color and Width, Default Label Style, Default Field Style, and Default Picture Style. The options in these sections are pretty self-explanatory.

When you've selected your options, click *Save Default*. Next time you create a form or report, it will have the look you prefer.

**By Celeste Robinson**

*Celeste Robinson is a contributing editor for* PC World *and the author of* The Paradox 5.0 for Windows Handbook *(Random House Electronic Publishing, New York, 1994).* Data Management *welcomes your questions (see page 12 for contact information).* ■


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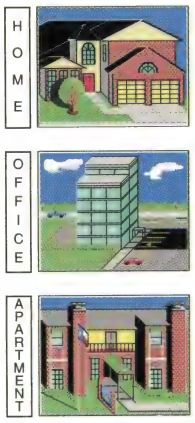


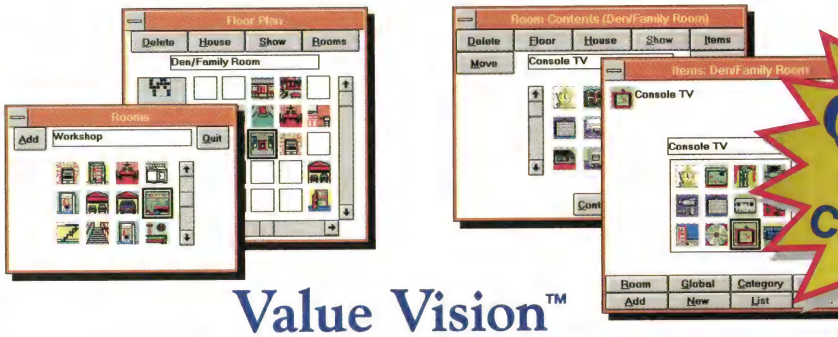


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## PUBLISHING & PRESENTATIONS MAKEOVER

### The Cutting Edge

Your newsletter speaks volumes about you, so you want it to speak eloquently and to use the right tone of voice. This month's makeover pick comes from the International Interactive Communications Society, Los Angeles chapter. Each month, IICS/LA issues this eight-to-ten-page bulletin—created in QuarkXPress—to keep members informed about happenings in the multimedia community. Covering a communications frontier, the newsletter should say modern, clean, or even hip—words we tried to keep in mind for this redesign.

### A Little off the Top...

The "before" version had almost no margins anywhere. Our first move (after translating the original from Quark to PageMaker, our designer's favored app) was to take a little off the top and sides, increasing the margins all around.

We then turned the masthead on its side and set it in lowercase letters—voilà, instant personality. Readers can't miss it, as their eyes invariably start at the left on any page. The original typeface had a kind of retro-seventies feel. The new typeface—a stretched version of Goudy Bold—looks more modern.

Moving the masthead to the side meant we could lop off the two heavy horizontal rules that threatened to decapitate the page. While we were at it, we removed the two lighter rules separating sections. We wanted to rely on space and subheads, instead of rules, to define the page's sections. Less clutter looks more contemporary.

Next, we turned to the lead story. In the original, this hybrid of straight text and listings uses bold, bold italic, italic, and regular type, making it look inelegant and disorganized. To give the story some visual coherence, we set off the names and titles in boldface type, using Optima throughout. This also keeps to a minimum the number of typefaces used in the document.

We also reworked the story title treatment. In the original, each story had two headlines: one lighthearted, the other serious and descriptive. We set the descriptive title in large, boldface type and put the secondary head above it in smaller, underlined italics.

### ...But Leave the Sides

The second story isn't too bad as it is, so we just trimmed some of the extraneous elements. The clip art was the first to go—the images look too much like filler, and don't fit in with our cleaner look. We also opted for three columns to provide contrast with the two-column format in the lead story. We then put the chapter meeting notice into a drop-shadow box to highlight it. It's important information, but in the original it was just a tertiary subhead that faded into the rest of the story.

Moving to the table of contents, we boxed it and shifted it to the lower right, where it visually balances the masthead in the upper left. To make it fit its new confines, we cut two of the blurbs. We put the section's head in lowercase Goudy Bold with substantial letter spacing, echoing the masthead; to set it apart from the rest of the page, we used reverse type.

The overall effect, we hope, is a kind of poised equilibrium. With boldfacing turned way down, typefaces consistent, justified type throughout, and text blocks forming subtly repeating rectangles, the newsletter achieves a singular voice—and speaks well of IICS/LA.

**By Valerie Singer and Art Weller**

*Art Weller, a designer based in Oakland, performed the document redesign. Valerie Singer is an editorial intern for* PC World. Publishing & Presentations *welcomes your questions and your makeover candidates (see page 12 for contact information).*

Before

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February 1994
Volume II
Issue 1
$1.00

The Official Journal of the Los Angeles Chapter of the International Interactive Communications Society

COMMAND.COM
CS/LA Announces its 1994 Officers

being set back four weeks from their original December date, elections for the Council of the Los Angeles Chapter of the IICS were held on January 12th — although "telelections" might be a better word. As befits a progressive organization working in the modern communications industries, Board nominations and absentee voting procedures were handled electronically, via the *IICS/LA Online BBS* (SysOp'ed by Tim Chambers).

**The 1994 Board Members are:**

***Co-Presidents: Barbara C. Benedict and Daniel Culbertson***

***Daniel Culbertson***
Daniel is a professional Computer Programmer/Analyst working for *Gillette*, and also works as an independent cross-platform interactive computer consultant through *DC Communications*. In 1993 he was the Publisher and Designer of *iNTER.COM* and Secretary of the IICS/LA Chapter. 310.929.0422

***Barbara C. Benedict***
Barbara is Special Projects Manager at *Vin Di Bona Productions* and has worked on a wide variety of projects including *America's Funniest Home Videos*, real-time interactive animation, new business development, and various presentations. She is Founder of *Good Faith Productions*, currently developing programming for interactive television and multimedia platforms, and an 1993 IICS/LA Chapter Council contributor. 213.661.8030

***Vice President: Lawrence Langs***
Larry is an independent Lawyer and Business Consultant specializing in CD ROM title development, VR systems and interactive television production. Larry is also an IICS/LA Chapter Legal Advisor. Tel: 818.509.5803.

***Secretary: Don Merriam***
Don is an Interface Designer who incorporates multiple disciplines in order to develop multimedia applications, from concept to product. Don has participated in many non-profit organizations and will help strengthen IICS/LA's internal communications. 714.893.7963

***Co-Presidents Elect for 1995:***
***PenRose Baldwin and Caron Weidner***
***PenRose Baldwin***
PenRose has been a member of IICS/LA since its inception over 8 years ago. She currently chairs the Educational Steering Committee, and was our Contacts Manager for 1993. PenRose works with her husband Glenn at *DesignForm Inc.*

***Caron Weidner***
Caron, who will continue as Advertising Chair for 1994, does sound engineering and audio production for interactive multimedia projects at *Soundelux Media Labs*. She also researches sample rate conversion techniques and multimedia development tools. 213.713.9473 (mobile w/message).

***Vice-President Elect for 1995: Chris Palmer***
Chris is Production Manager and Director of Marketing and Sales at *Professional Sound Corporation*. An audio technician and Product Designer for interactive electronic percussion controllers, Chris is involved in sound design and music composition, as well as kiosk and multimedia development. He is Founder and Leader of the Multimedia Audio Technologies Group SIG. 818.364.2577

Everything Old is New Again
Special Venues SIG Studies Interactive Museums

Chapter Meeting
Monday, February 28th
7:30 PM at The Electronic Cafe

*Interactive applications in the museum world* will be the focus of the Special Venues SIG's initial meeting of 1994. The first of our featured guests will be veteran interactive designer Scott Palamar, who will demonstrate museum exhibits on "Aids Awareness," "California Wine," and "How to Build a Jet Fighter" (all currently on display at the *California Museum of Science & Industry*). Eugene Gendel, former curator for the Museum's *Hall of Economics*, will participate along with Matt Roth, curator for the new *Petersen Automotive Museum* and the *Los Angeles County Museum of Natural History*. Both curators will give their perspective on such topics as the use of interactive media in museum environments, working with interactive vendors, educational and political issues, and the future of such applications in these venues.

Our moderator is the shaken-but-unstirrable Jon Leonoudakis (a little seismic humor there) — SV SIG leader and executive producer for *Media Vision*. Jon has produced disc-based film and video media for Harrah's *Automobile Museum* and Universal Studios' *Backdraft* Attraction. Admission is $5.00 for IICS members and $10.00 for non-members. *NOTE: The SV SIG's first two events were filled to capacity, so attendees are encouraged to RSVP with Jon at 818.883.7560.*

iNSIDE
This Issue:


**Say What?** 2
The Multimedia Audio Technology Group hears the latest in speech recognition in sunny Santa Ana.

**Interactive Fiction SIGs Mediatrix** 2
Is the good old fashioned Role-Playing-Game the best model for interactive fiction? Find out in this two part IF SIG experience moderated by Joe Futerman & Tod Foley.

**Business Update: Hollywood SIG Style** 2
The Hollywood SIG updates our membership with the latest Business and Legal considerations for the interactive producer.

**Fresh POV** 3
Women in Films' Women in Technology Council is holding a special event at Digital Hollywood and the IICS/LA membership is invited.

**VR Sports** 3
Can Monday morning quarterbacks finally relive the game the way they intended? The Virtual Reality SIG has the answer.

**Lest Ye Be Judged** 4
The CINDY awards are coming and we are looking for some good Judges of interactive character.

**INTER.ACTIVITIES** 6
All of the month's IICS/LA activities on one page. Plan your next interactive date with this handy calendar. Suitable for framing.

**Photosource Council Meeting** 7
A new cafe in Santa Monica is the place for our February council meeting. Come to the meeting and find out how you can become an integral part of IICS/LA in 1994.

**What is Interactive?** 7
Interactive Fiction SIG leader Joe Futerman tackles this deceivingly simple question.

**After**

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FEBRUARY 1994

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# IICS/LA Announces Its 19

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Chris is Production Manager and Di
Sales at Professional Sound Corporation. An audio technician and product designer for interactive electronic percussion controllers, Chris is involved in sound design and music composition, as well as kiosk and multimedia development. He has worked with such well-known musicians as Al Green and Axl Rose. Chris is founder and leader of the Multimedia Audio Technologies Group Sig. 818.364.2577.

**inside**

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*Everything Old Is New Again*

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veteran interactive designer Scott Palamar, who will demonstrate museum exhibits that he designed on "AIDS Awareness," "California Wine," and "How to Build a Jet Fighter" (all currently on display at the California Museum of Science and Industry). Scott's specialty is audience participation. He invites viewers not only to interactively direct the flow of a presentation, but also to actively respond to it.

Eugene Gendel, former curator for the Museum's Hall of Economics, will participate along with Matt Roth, curator for the new Petersen Automotive Museum and the Los Angeles County Museum of Natural History. Both curators will give their perspective on such topics as the use of interactive m
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*NOTE: The SV SIG's first two events*

**Chapter Meeting**
Monday
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7:30 PM
at The Electronic Cafe

**Rotating the masthead and using lowercase type gives the newsletter style. We used Goudy Bold, stretched 200 percent, with thin, spaced letters below providing a contrast.**

**Small can be powerful. Shrinking the table of contents doesn't reduce its impact, especially when it's set off in a gray tint box. The s-t-r-e-t-c-h-e-d title echoes the masthead's format.**

**Using two columns in the lead story and three in the second story provides visual pizzazz.**

**Story headlines now have a consistent treatment—boldface and flush left, in the same type family (Optima) as the body text.**

**Look at the original (left) and try to find the date of the next chapter meeting. To make it stand out, we put the information in a box with a drop shadow.**

## COMMUNICATIONS Q & A

### Finding Good Stuff on the Internet

**Q** I keep hearing about all the wonderful stuff that is available on the Internet. But in my first forays onto the Net, all I discovered is confusion. Is there some way that I can find out which databases and other resources are available online?
*Tom Morgan, Switzer, Pennsylvania*

**A** Finding the information you need online can be like trying to navigate your way around New York City without a map. To get you oriented, I recommend two guidebooks.

To get your bearings on the Internet, check out *The Internet Yellow Pages* by Harley Hahn and Rick Stout (Osborne/McGraw-Hill, 1994, $27.95). This compendium tells you where to find information on everything from agriculture to zoology. Many of the book's listings are entertainment-oriented, but it also describes resources for business users, including Usenet discussions on financial topics and the Federal Reserve's *Commerce Business Daily,* which details projects that are open for bid. Consider yourself warned, however: The Internet changes daily, so no guidebook can claim to be truly complete and up-to-the-minute for long.

If your online travels take you beyond the Internet, check out *The Whole Earth Online Almanac* by Don Rittner (Brady, 1993, $32.95). This is an easy-to-use Baedeker to the databases and E-mail discussions found on *all* the major public online services, including CompuServe, America Online, Dialog, Prodigy, and the Internet. If you do any kind of online searching, or if you subscribe to more than one service, and you want just one book to help make your online navigation easier, the *Almanac* is the one to get.

### Automating Mail on America Online

**Q** Is any software available for America Online that will let me write mail offline, then log on and upload it?
*Peter Elcho, Warner, Ohio*

**A** You've Got Mail is a handy little shareware utility that works with the Windows version of America Online's software. It lets you compose E-mail offline, then it logs on to AOL, posts your messages, and downloads any waiting ones. The program also has a built-in editor and an address book for storing correspondents' E-mail addresses. Unfortunately, the program doesn't automate your America Online sessions to the same degree as front ends for CompuServe and other services—it won't, for instance, retrieve messages from public forums or search for files. But it's still an indispensable add-on for AOL users, pruning the time you spend online and saving you money as a result. You can download the file YGM-.ZIP from PC World Online, or send a check (along with your preferred disk size) to Rachel Barnot.

- **You've Got Mail** $22.45; Rachel Barnot; 2826 Penny Lane, Austintown, OH 44515.
  **Reader service no. 730**

**The Internet Yellow Pages tells you where you can find information on everything from agriculture to zoology.**

### Forcing WinFax to Wait for an Answer

**Q** I use WinFax Pro to send faxes overseas, but there's a little glitch with the program that I can't seem to figure out. Fax machines "over there" are frequently set to answer on the sixth ring. By the time the international line connects and the fax machine at the other end answers, WinFax Pro has already hung up. I could dial manually, then try to connect WinFax and have it transmit, but that's a major hassle. Is there any way to extend the time WinFax waits to hang up and retry?
*Jim Jones, Metairie, Louisiana*

**A** All fax programs—and general communications programs as well—have a "retry" option that tells the modem how long to wait for an answer before hanging up and trying again. All you have to do is find this option and boost the number of seconds the modem waits. The retry setting is usually hidden in one of the modem or connection setup screens.

In WinFax Pro, select *Fax • Program Setup • Dial.* This should bring up the Dial Setup dialog box. Boost the value in the Retry time box from 60 seconds to 120 (or however long you think it'll take to make the connection), then click *OK.* If you still have problems, keep upping the retry interval until your faxes go through.

### More on Faxing Handwritten Signatures

In response to "Faxing Handwritten Signatures" in the October *Communications,* Jeff Jones of Middleton, Ohio, writes about his own technique (for another approach, see the Font Source item in this month's *Quick Takes*):

Jones gets signatures (and other simple black-and-white graphics) into documents he plans to send by fax-modem by first transmitting a paper fax from a drugstore down the street to his fax-modem. Back home, he opens the transmission containing the signatures or graphics in his fax software, cuts them out using Windows Paintbrush's Edit and Paste commands, and saves them as bitmapped graphics (BMP) files that he can paste into faxes and word processing documents. "You don't want to use this for super high-quality graphics work," Jones says, "but it works great for signatures and logos."

**By Judy Heim**

*Judy Heim is a contributing editor for* PC World *and author of the guide to communications in* The PC Bible *(Peachpit Press, 1995).* Communications *welcomes your questions (see page 12 for contact information).*

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## HARDWARE Q & A

### The CD Difference

**Q** I've read that a CD-ROM drive can play regular audio CDs. Is there an adapter that will allow you to use a regular CD player as a CD-ROM drive?
*Ed Weidig, Wahiawa, Hawaii*

**A** Nice thought, but no dice: For one thing, audio CD players convert the digital code on CDs to analog sound output, and your PC needs digital input. For another, your PC must be able to control the drive's laser reader in order to fetch the proper data, and audio CD players just aren't built that way. The only connection you can make between an ordinary CD player and your PC is to plug the thing into a sound card's external input jack, so you can digitally record music, edit it, add special effects, and mess around.

If price is your main concern, and all you want is a drive for reading CD-ROM disks full of clip art or fonts, you can find a drive for less than $100 to do the job. If you want a drive fast enough for multimedia purposes, you'll have to pay more—but not much more. At this writing, CompUSA is selling Sony's excellent double-speed CD-ROM drive, the CDU-33A, for $185. You can use *it* to play audio CDs if you like.

### The Hot-Wired PC

**Q** I recently read an article that said you can speed up a computer by replacing its clock chip. Can I do this with my 25-MHz 386? How much of a performance increase would I get?
*Shane Mook, Spring Green, Wisconsin*

**A** That depends on the speed of the replacement clock chip—and on whether your system can take the punishment. I've always discouraged this classic "cheater" method of squeezing out extra performance. The clock chip sets the tempo for computing, and when you pick up the pace, you're pushing things beyond the speed at which your motherboard and CPU have been tested. Swap in, say, a 33-MHz clock chip, and you may start getting weird errors, or your system may refuse to function entirely. You may also shorten the life span of your CPU, which will run hotter.

On the other hand, you have an old machine. If you don't use it for anything critical, and you don't care about wearing it out since you plan to buy a new system soon anyhow, then I doubt I've talked you out of pushing the clock. In that case, do me a favor and don't push it over 30 MHz. You can get a 30-MHz replacement clock chip from the mail-order electronics company Digi-Key for under $10. Just check the part number on your existing clock chip, and have that information ready when you call.

The clock chip is in a socket near the CPU. It looks like a tiny sardine can—about the size of the nail on your little finger—and it's probably covered with a nylon strap. To remove it, cut the strap with a pair of wire cutters and work the chip out with your fingers (or use a chip puller, which you can also buy cheap from Digi-Key). Put it in a safe place and then plug in the new clock chip. The nylon strap was there to keep the chip from working itself out, so check the new chip periodically to make sure it's still in place. And remember: If your PC freaks out at the speed boost, you can always swap the old chip back in.

- **Digi-Key;** 800/344-4539
  **Reader service no. 731**

### The Case of the Missing Pointer

**Q** I have a super-VGA monitor and a Windows accelerator board. When I run a DOS application under Windows and then switch back to Windows itself, the screen flickers, I hear a low buzzing sound, and the mouse pointer disappears. The only way to get the pointer back is to restart Windows. (I tried to install Windows' Super VGA driver to see if the trouble was the video board's Windows driver, but all I got was a blank screen.) Is this a problem with the mouse driver or the video?
*Christian Hess, San Jose, Costa Rica*

**A** Sounds like a whale of a video problem. The buzzing sound from your monitor and the board's inability to work with Windows' generic Super VGA driver—something all video boards should be able to do—suggest that your board is the culprit. If you lived in the United States, I'd suggest you have the manufacturer replace the board, but this may not be practical for you. Your best bet is to log on to the manufacturer's BBS and see if you can download a more recent driver. If you're lucky, installing the new driver will correct the problem. If not, try to get the manufacturer to send a new board before you send the old one back.

### The Phantom File

**Q** I just replaced my old hard drive with a Seagate 243MB model and installed DOS 6.2 and Windows along with my applications. I checked my drives with The Norton Utilities and found an "unmovable" file named 386SPART.PAR taking up 16MB of disk space! What is this huge file, why is it unmovable, and how can I get rid of it without screwing up my disk?
*Jim Essick, Silver City, New Mexico*

**A** Don't delete that file! That's Windows' permanent swap file, and if you delete it, Windows won't run. It *is* awfully big, however, and you can reduce its size easily. Start Windows, head for the Control Panel, double-click on *386 Enhanced*, and click the *Virtual Memory* button. In the resulting dialog box, click *Change* to see what size swap file Windows recommends. I'd be surprised if it's more than 7792K, less than half the size of your current swap file. Enter that number, and you'll have saved yourself 8MB or so.

### New Modem, Old Chip

**Q** I have an old PC with no slots where I could install an internal modem. But I've heard it's unsafe to use a 14.4-kilobits-per-second external modem with an old-fashioned serial port like

mine. How do I upgrade my serial port, and where do I get the parts?
*Nicholas Crawford, Madison, Ohio*

**A** It's not *unsafe*—you won't break anything—but you may drop connections, and you'll get subpar performance. Look for your Universal Asynchronous Receiver/Transmitter—the serial port chip; it should be in a socket near the back of your motherboard. To see if your UART is old-fashioned (an 8250A or a 16450), type **MSD** at the DOS prompt, and press **C** to display COM port settings. At the bottom of the list is the entry 'UART Chip Used'. If you have a dinosaur, open your PC, pull the UART from its socket, and replace it with a 16550A UART chip. You can buy one of these from Jameco Electronics for $10.95.

- **Jameco Electronics;** 800/831-4242
  **Reader service no. 732**

### Achieving Parity

**Q** In your July column, you stated that only older systems used SIMMs without parity checking and that systems *with* parity memory were more reliable. Well, I have a 486SX-33 that's a year-and-a-half old, and it has nonparity SIMMs. I'm planning to upgrade my memory soon. Should I reconfigure my machine for parity memory?
*Norman Watt, Ithaca, New York*

**A** Apparently my information on parity checking was a little dated, and many system manufacturers these days (including Compaq) sell systems that use nonparity memory. Parity checking—a scheme for memory error detection that requires an extra address line—adds significantly to the cost of a system. And what do you get in exchange? A PC that constantly tests itself for memory errors, rather than one that tests itself only at start-up.

If a system with parity memory encounters an error during operation, it pops up an error message containing a code number that may help you or a technician track down a bad SIMM. (*SIMM* stands for *single in-line memory module.*) In a PC without parity memory, if a memory chip goes bad while your system is running, you probably won't know that the problem (if noticeable) is a memory error. You'll know next time you boot, however, because all systems check their memory and report any errors at start-up.

Parity SIMMs cost a little more than nonparity SIMMs. Some systems—possibly yours—allow you to enable or disable parity by moving a jumper (check your documentation to make sure). If your system allows you to choose between enabling and disabling parity checking—and if you're replacing these memory modules anyway—then I recommend that you opt for parity memory. If your system takes 30-pin SIMMs, this means you should get so-called 1x9 SIMMs; if it uses 72-pin SIMMs, get 1x36 SIMMs.

**By Eric Knorr**

*Eric Knorr is a contributing editor for* PC World *and is the editor and principal writer of* The PC Bible *(Peachpit Press, Berkeley, California, 1995).* Hardware *welcomes your questions (see page 12 for contact information).* ■

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## STAR-DOT-STAR TIPS

### Slow Down, You Move Too Fast

I often find that the new, powerful computers run older games much too fast. This is usually caused by timing loops in the software that don't provide adequate delays on fast machines. I've written a terminate-and-stay-resident program (TSR) called SLOW.COM that solves this problem by slowing your machine to an acceptable speed.

To create SLOW.COM, type the listing [shown in **FIGURE 1**] into a text file and name it **SLOW.SCR**. Then enter the command **DEBUG < SLOW.SCR** at the DOS prompt. If the game is still too fast after you run SLOW.COM, enter the command again until the speed is tolerable.

*Jamie Jennings,*
*Lewisporte, Newfoundland, Canada*

**Editor's note:** If you're on PC World Online, you can download SLOW.SCR directly from our library. SLOW.COM isn't just a way to slow down games that run too fast; it's also a good tool for novices who are just learning a game and want to start slowly. Assembly language–savvy readers will note that every time the computer's internal clock ticks, SLOW.COM steals some computing time from the CPU by executing a loop that does nothing. The program keeps stealing time until the system is rebooted, so make sure that you restart the system when you want to get back to work.

Because some games run faster than others, you may want to create separate batch files that can each launch multiple instances of SLOW.COM, effecting a greater cumulative slowdown. Each batch file would execute SLOW.COM the appropriate number of times for a particular game, then start that game. The batch files could even reboot the machine afterward, to ensure you don't leave SLOW.COM running by mistake. You should also note, however, that the SLOW.COM program won't work with newer games that don't use timing loops to pace their action.

```
nslow.com
a100
jmp 112
db 0,0,0,0
push cx
mov cx,3e8
loop 10a
pop cx
cs:
jmp far [102]
mov ah,35
mov al,1c
int 21
mov [102],bx
mov [104],es
mov ah,25
mov dx,106
mov al,1c
int 21
mov dx,0112
int 27

rcx
2e
w
q
```

**FIGURE 1: SLOW DOWN FAST GAMES using SLOW.COM, which you create with this DEBUG script.**

### Fancy WordPerfect Footwork

If the footnotes in your WordPerfect 5.1 documents look odd, the problem may be simply that they have different margins than the rest of the document. Unfortunately, this is hard to fix because the program provides no command for formatting footnote margins. These margins are based on your Initial Codes settings rather than the settings on the Document Format screen (accessible through <Shift>-<F8>), so getting the entire page's margins in sync requires some sleight of foot. With the document open, press **<Shift>-<F1>45** to enter the Initial Codes section of WordPerfect's Setup menu; then press **<Shift>-<F8>** to set the initial margins to match the document's. Exit the Setup menu, then save and close the document.

Here's the tricky part: With the blank screen before you, press **<Enter>** once to place a hard return on the first line, then retrieve your file. If you print or preview the document you'll see that the footnotes' margins match the document's. To make this change permanent, save the document. You can then reset the Initial Codes so that they reflect your usual preferences.

*Suzanne Corber, New York*

**Editor's note:** It may seem circuitous, but this is the only way I know of to format footnote margins in WordPerfect 5.1. But note that the technique can backfire if you're not careful. Let's say you've formatted the document to your liking, and then changed the margin settings in the Initial Codes screen back to their default values. If you now retrieve the document into another document that contains different Initial Codes margin values—or one that consists of just a single carriage return—the footnote margins will change again.

Also note—this tip doesn't work with WordPerfect 6.0 for DOS. To format footnotes in that version, press **<Ctrl>-<F7>**, select *Edit Style in Note*, then press **<Shift>-<F8>** to set the margins.

### DOS Copy Crash

I found a potentially dangerous bug in MS-DOS 6.2. When you use the COPY or XCOPY commands to copy a file over an existing (but smaller) file with the same name on a floppy disk that doesn't have room for the new file, you understandably get the messages 'Insufficient disk space' and '0 file(s) copied'. What DOS *doesn't* tell you is that during this process it has destroyed the file you tried to overwrite. If you attempt to unerase the file, you'll find that it's been corrupted and can't be retrieved.

*Stephen G. McConnell,*
*Kingsport, Tennessee*

**Editor's note:** I duplicated McConnell's results by attempting to write over a file on a nearly full floppy. Sure enough, DOS didn't realize in advance that it could not fit the new file on the disk, but it had already deleted and

overwritten the old one by the time it figured this out. The Norton Utilities' Unerase program gave the overwritten file a "poor" prognosis for recovery, which essentially means it is gone for good. After further testing, I discovered this tip applies to hard disks as well as floppies. So beware—any disk that's full, or nearly full, is ripe for serious problems if you use DOS's COPY or XCOPY commands to replace files on it.

### Fast Repeat

Is the key repeat rate on your computer too slow? DOS has a little-known command that solves the problem. Try **MODE CON: RATE=32 DELAY=1**, and watch your sluggish keyboard speed up.

*Sriram Gollapalli, Bethesda, Maryland*

**Editor's note:** The RATE parameter sets the repeat rate; on my computer, a setting of 1 yields about 2 characters per second, while 32, the maximum, yields approximately 30 characters per second. The exact number seems to depend upon the computer. DELAY sets the amount of time you must hold down a key before it begins to repeat. DELAY is specified in quarters of a second; that is, 1 is a quarter of a second, and 4, the maximum, is a full second. Personally, I find 1 a little short; 2 or 3 is more my speed. This MODE command affects only DOS and DOS applications; the Control Panel utility provides similar key repeat rate controls for Windows and Windows applications.

### Extra SatisFaxtion

I use Intel's SatisFaxtion board to send many letters each day. I've found a simple way to prepare professional-looking documents that contain the letter's text, my signature, and a letterhead design or other graphic image. The fax-modem's DOS-based fax program doesn't provide a way of combining these elements into a single fax file. I could fax documents that contain both text and graphics from a word processor, using Intel's included FAXPOP program, but FAXPOP doesn't let me preview rendered faxes before sending or schedule a fax broadcast to multiple numbers. To get around these limits, I use a third included utility, PRN2FAX, to embed graphics in my text files and convert them to fax files that SatisFaxtion's fax program can read.

After writing the letter in my text editor, I embed graphics in it, using a string that tells PRN2FAX where to find the graphics file and how to position it (for my signature, for example, the line looks like this: "+PCXH: C:\FAX\SIG.PCX"). When PRN2FAX processes this text file and ▶

USER GROUP TIP

## Version Vision

**Find out which version of DOS your system is using by entering VER at the DOS prompt. To find out the revision of that DOS version, and whether DOS is running in High Memory, add a space and the undocumented /R switch after the VER command.**

**Andy Oliver**
**North Texas PC Users Group**


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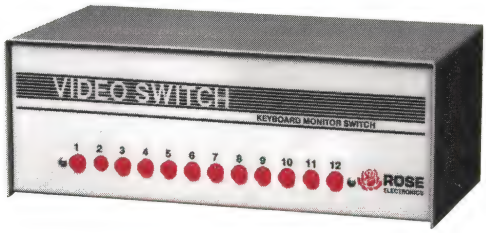


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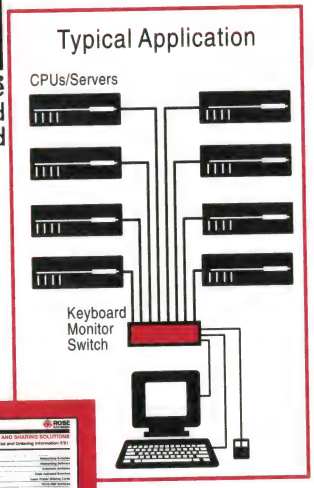


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```
COPY %1 /A FAXTMP.TMP /B
PRN2FAX FAXTMP.TMP C:\FAX\OUTBOX\SENDME.DCX /A
DEL FAXTMP.TMP
```

**IGURE 2: CREATE FAST FAXES at the DOS prompt with the ntel SatisFaxtion board using this batch file.**

s embedded codes, it combines the signaure with the text and produces a DCX ile—a file composed of multiple images in PCX format—containing the outgoing fax.

I've written a batch file [**FIGURE 2**] that utomates the process of preparing a fax rom a text file and including embedded pictures. First it copies the text file (given as a command-line parameter) to a temporary file, deleting the end-of-file character (ASCII 26) if it's present. This prevents the fax from ending with a funny character (usually an arrow pointing to the left) due to the EOF character. Next the batch file runs PRN2FAX and sends the output to a file called SENDME.DCX, located in a convenient place—the fax program's OUTBOX directory. This is the default directory where you pick files to send, so it's easy to select and send the letter. Finally, the batch file cleans up by deleting the temporary file.

*Heather Moore, Las Vegas*

**Editor's note:** This batch file is all you need to create letters as text files and send them off quickly. One other neat trick that's built into the Intel software: If you use **/H** instead of /A at the end of the second line, PRN2FAX interprets HP LaserJet printer codes in the text file to produce boldface and underlined text.

### Sweep Mines Under the Rug

If you enjoy playing Windows 3.1's Minesweeper, here's a way to win every time. Choose the *Desktop* icon in the Windows Control Panel and set both Pattern and Wallpaper to *(none)*. Select Control Panel's *Colors* screen and pick a dark color, such as black, for the desktop background. Open Minesweeper, minimize or move any window covering your desktop's upper left corner, and make Minesweeper the active window. Move the mouse cursor over the Minesweeper playing field, type the magic word **XYZZY**, press **<Enter>**, then press and release **<Shift>**. Now, as you move your mouse around the playing field, you'll notice that the pixel in the screen's upper left corner turns white when the mouse cursor is not over a square with a mine, and black when it is over a mine.

*Philemon Pang,*
*Scarborough, Ontario, Canada*

**Editor's note:** Windows programs are full of tricks and trapdoors, and Minesweeper's no exception. I used this trick to amaze my friends, with one difference: I found that a picture or pattern on the desktop, instead of plain black, made the telltale pixel much harder for my audience to spot.

**By Brett Glass**

*Brett Glass is a contributing editor for* PC World. Star-Dot-Star *welcomes your tips, macros, batch files, and short programs (see page 12 for contact information).*


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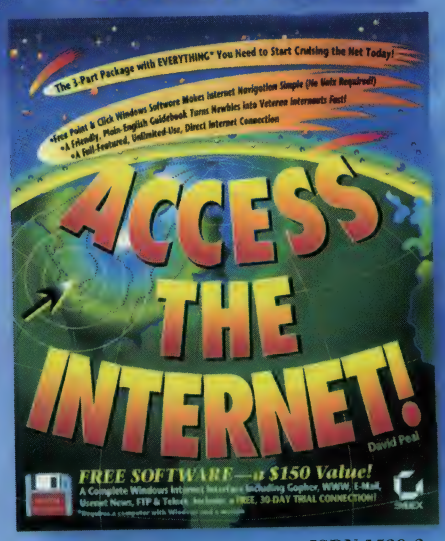


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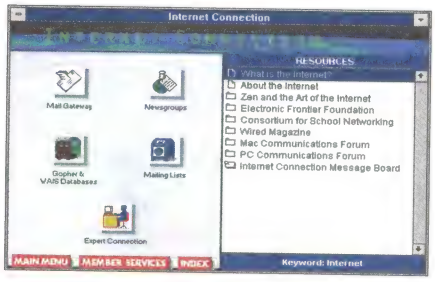


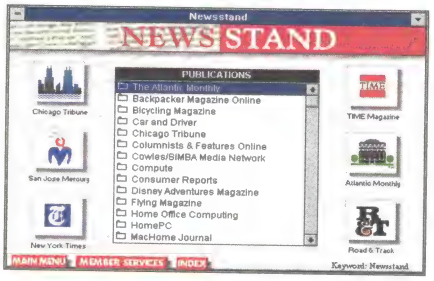


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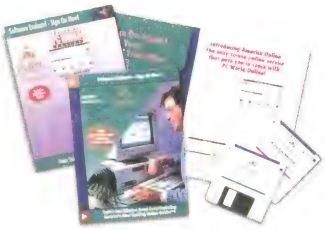

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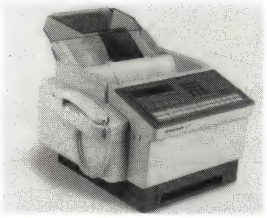

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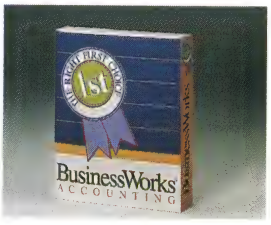


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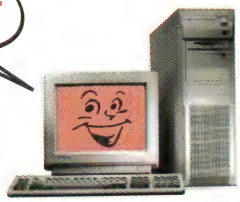

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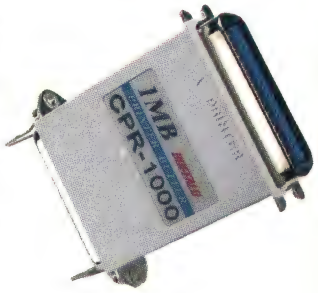


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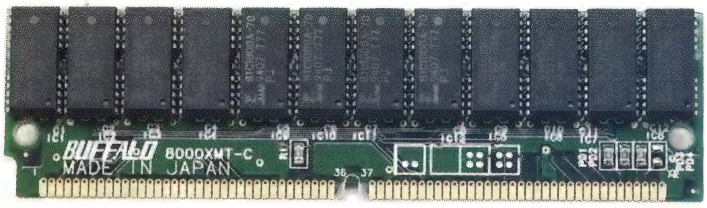


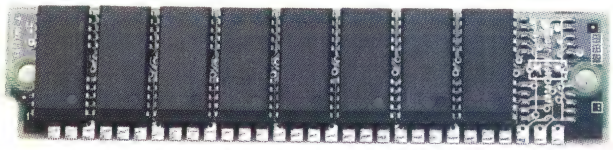

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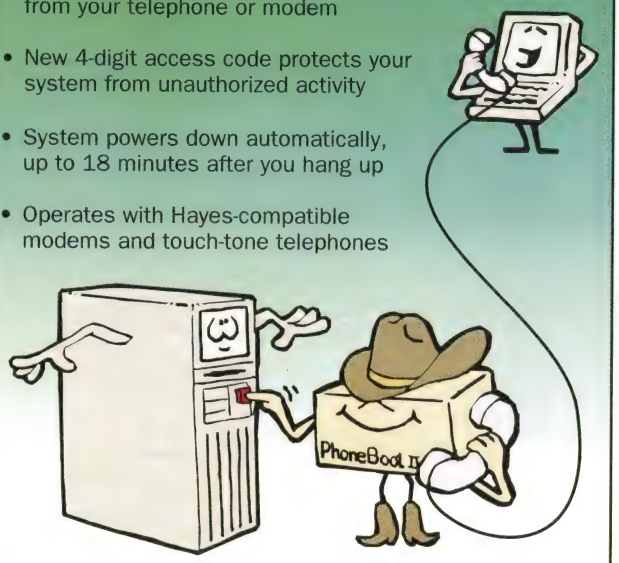


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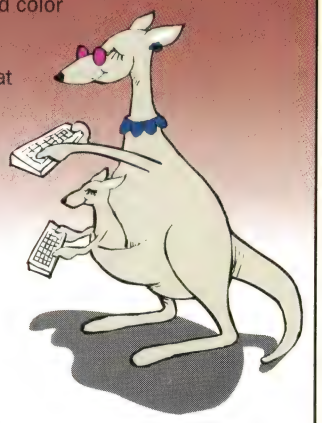

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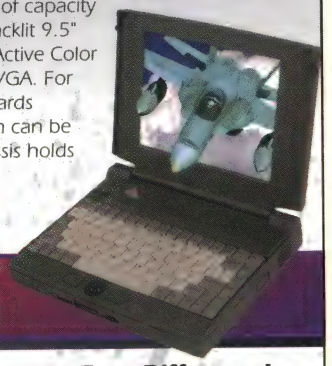

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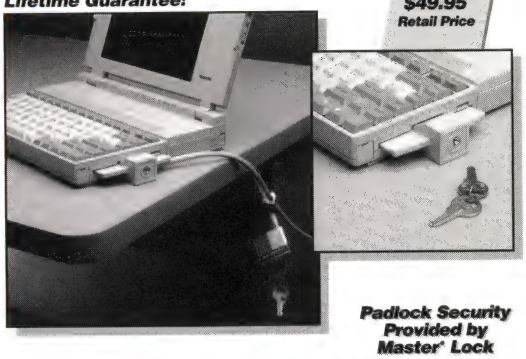

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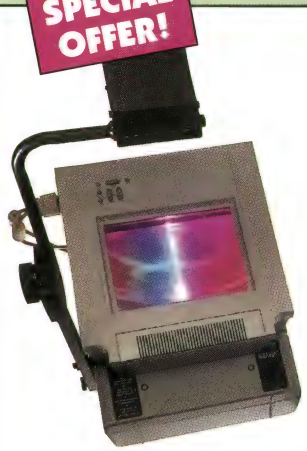

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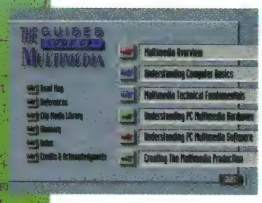

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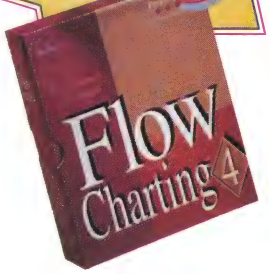


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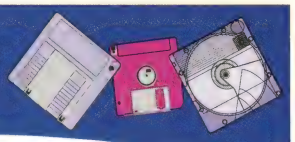

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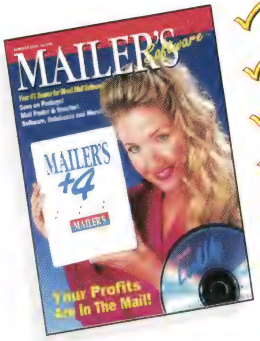


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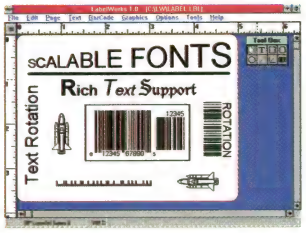


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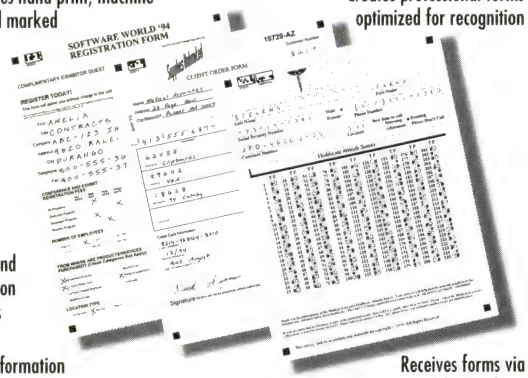

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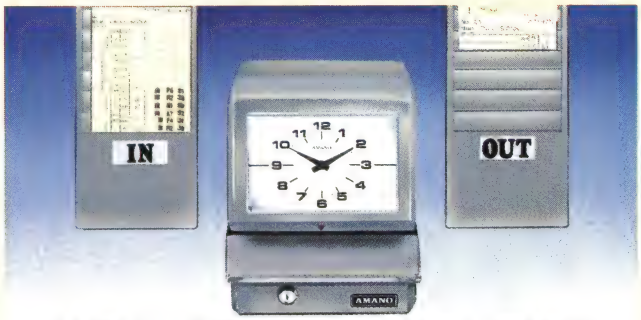


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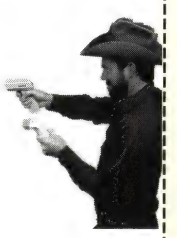

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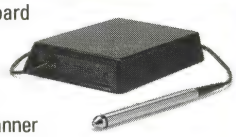

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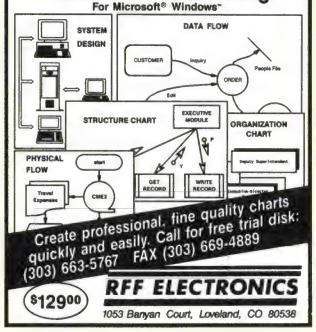


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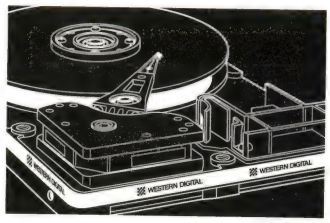

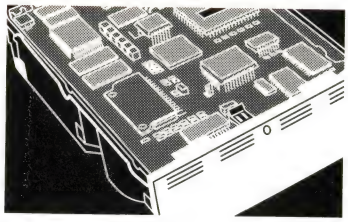

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|---|---|---|---|
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|---|---|---|---|
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| 541MB | 12ms | LPS540A | $259 |
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| 270MB | 12ms | LPS270S | $195 |
| 342MB | 12ms | LPS340S | $235 |
| 541MB | 12ms | LPS540S | $269 |
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| 2160MB | 9.5ms | IMP2160S | $1099 |

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|---|---|---|---|
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| 2040MB | 9.2ms | 70G8493 | $1249 |
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| 200MB | SQ5200C | $399 | $599 | $519 |
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PCMCIA drives — Floppy Drives
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|---|---|---|---|---|
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| NEC | CDR510 | 3X | 195ms | $299 |
| Toshiba | XM3401 | 2X | 200ms | $260 |
| Toshiba | XM4101 | 2X | 320ms | $215 |
| Teac | CD50 | 2X | 265ms | $209 |
| Media Vis. SH93R | | 2X | 280ms | $165 |

HOT DEAL, Macintosh external $255

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| | | | |
|---|---|---|---|
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| DRM1804X | 18 disc | 612KB/sec | $2079 |

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SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP.

| | PREM | PRO | SB | SA |
|---|---|---|---|---|
| SH93R | $309 | $445 | $309 | $379 |
| XM4101 | $365 | $489 | $359 | $425 |
| CD50 | $359 | $485 | $359 | $425 |
| XM3401 | $425 | $549 | $425 | $479 |
| CDR510 | $499 | $619 | $499 | $559 |
| PX43CH | $659 | $779 | $659 | $699 |

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| ADAPTEC | Alone | w/Drive |
|---|---|---|
| A1522BASIC 16Bit SCSI | $119 | $109 |
| A1542CBASIC 16Bit SCSI | $225 | $215 |
| A2742 EISA SCSI | $319 | $309 |
| A2842 VESA SCSI | $279 | $269 |
| Future Domain 1680 16Bit SCSI | $155 | $139 |
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| 4C 16Bit supports 8 IDE | $139 | $119 |

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Kit includes 16bit card, DOS or Windows software & 1 tape.

| | | | Bare | Kit |
|---|---|---|---|---|
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| 525MB | Conner | C2525 | $479 | $679 |
| 580MB | Teac | MT01F | $399 | $599 |

NEW! Conner Floppy interface 700MB Internal kit $299 Parallel portable $449

| | | | | |
|---|---|---|---|---|
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| 2Gig | HP | 35470 | $829 | $969 |
| 2-4Gig | Conner | 3200 | $589 | $739 |
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| 4-8Gig | HP | 35480 | $929 | $1079 |
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| 4-16Gig | Conner | 4326 | $969 | $1139 |
| 4-16Gig | HP | C1533A | $1169 | $1329 |
| Novell NLM 50 user / unlimited | | | $229/$389 | |
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|---|---|---|---|
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| Portable for PC | $899 | $1099 | $2469 |

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|---|---|---|---|
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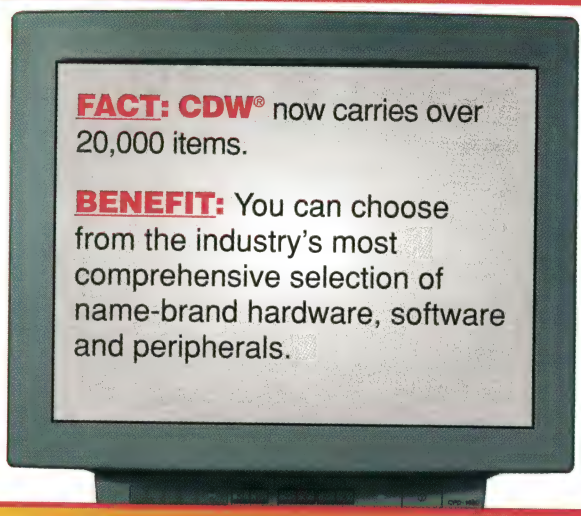

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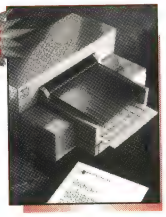

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| Central Station II | 389.13 |
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| NodeRunner starter kit-WIN | 479.29 |
| Simply LANtastic starter kit | 163.79 |
| Simply LANtastic V1.0 | 47.99 |
| T-Runner 8 port 10BT | 293.92 |
| T-Runner 12 port 10BT | 488.41 |

### SMC®

| | |
|---|---|
| Ultra16 Ethernet coax | 105.25 |
| Ultra16 coax 6pk | 576.75 |
| Ultra16 Ethernet 10BT | 105.25 |
| Ultra16 10BT 6pk | 534.20 |
| Ultra16 10BT 24pk | 1857.28 |
| Ultra16 Ethernet combo | 119.35 |
| Ultra16 combo 6pk | 639.21 |
| Ultra16 combo 24pk | 2252.32 |
| EtherCard+ Elite coax | 119.64 |
| EtherCard+ Elite coax 5pk | 628.73 |
| EtherCard+ Elite MCA coax | 189.26 |
| EtherCard+ Elite 10BT | 119.12 |
| EtherCard+ Elite 10BT 6pk | 618.61 |
| EtherCard+ Elite MCA 10BT | 181.57 |
| EtherCard+ Elite EISA 10BT | 579.78 |
| EtherCard+ Elite combo | 139.57 |
| EtherCard+ Elite combo 6pk | 753.59 |
| 3608 Ethernet 8 port hub 10BT | 298.85 |
| 3512 Ethernet 12+2 port hub 10BT | 548.55 |
| PC600WS ARCNET coax | 119.93 |
| PC650WS ARCNET TP | 119.88 |
| PC130 ARCNET coax | 68.50 |
| ARCNET 8 port active hub coax | 229.41 |
| TokenCard Elite 16/4 | 249.86 |

### 3Com®

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|---|---|
| 3C503 Etherlink II coax | 159.44 |
| 3C509 Etherlink III coax | 115.50 |
| 3C509 Etherlink III coax 5pk | 489.02 |
| 3C509 Etherlink III 10BT | 115.50 |
| 3C509 Etherlink III 10BT 5pk | 442.36 |
| 3C509 Etherlink III combo | 132.73 |
| 3C509 Etherlink III combo 5pk | 532.84 |
| 3C579 Etherlink EISA coax | 229.91 |
| 3C579 Etherlink EISA 10BT | 229.91 |
| 3C1627 12 port Linkbuilder 10BT | 609.94 |

## NETWORKING PRODUCTS

### OTHER TOP-QUALITY NAME BRANDS

| | |
|---|---|
| Eagle NE2000+ coax | 81.32 |
| Eagle NE2000+ 10BT | 77.31 |
| Eagle NE3200 coax w/TPA | 429.61 |
| National Semi NE2000+ coax | 76.16 |
| National Semi NE2000+ 10BT | 67.46 |

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### Xircom

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|---|---|
| PE310BC pocket Ethernet coax | 309.89 |
| PE310B2 pocket Ethernet coax | 267.80 |
| PE310BT pocket Ethernet 10BT | 268.31 |
| PA202B6 pocket ARCNET coax | 229.30 |
| Pocket Token Ring III | 455.89 |
| PPX03 Parallel port multiplexor | 77.80 |

### IBM TOKEN RING

| | |
|---|---|
| IIBM Token Ring 16/4 ISA | 409.30 |
| IBM Token Ring 16/4 MCA | 489.56 |
| IBM Token Ring MAU | 458.88 |

### intel

| | |
|---|---|
| EtherExpress PRO Flash 10BT | 115.07 |
| EtherExpress PRO Flash 10BT 5pk | 482.72 |
| EtherExpress PRO Flash 10BT 20pk | 1489.89 |
| EtherExpress PRO Flash combo | 115.07 |
| EtherExpress PRO Flash combo 5pk | 505.98 |
| EtherExpress PRO Flash combo 20pk | 1827.22 |
| EtherExpress 16 coax | 99.33 |
| EtherExpress 16 coax 5pk | 454.13 |
| EtherExpress 16 coax 20pk | 1698.38 |
| EtherExpress MCA coax | 166.52 |
| EtherExpress 16 10BT | 99.33 |
| EtherExpress 16 10BT 5pk | 454.13 |
| EtherExpress 16 10BT 20pk | 1698.38 |
| EtherExpress MCA 10BT | 166.52 |
| EtherExpress 16 combo | 116.77 |
| EtherExpress 16 combo 5pk | 549.72 |
| EtherExpress 16 combo 20pk | 2036.93 |
| EtherExpress Flash 10BT | 111.88 |
| EtherExpress Flash 10BT 5pk | 515.62 |
| EtherExpress Flash combo | 129.79 |
| EtherExpress Flash combo 5pk | 619.73 |
| EtherExpress EISA coax | 409.88 |
| TokenExpress 16/4 | 349.94 |
| NetportExpress II COAX | 387.07 |
| NetportExpress II 10BT | 368.85 |

## TAPE, REMOVABLE & FLOPPY DRIVES

### COLORADO MEMORY SYSTEMS INC.

| | |
|---|---|
| Jumbo 120MB internal | 99.80 |
| Jumbo 250MB internal | 174.34 |
| Trakker 120MB parallel port | 209.90 |
| Trakker 250MB parallel port | 334.40 |
| Powertape 2.4GB SCSI internal | 937.58 |
| Powertape 2.4GB SCSI external | 1077.99 |
| PowerDAT 4GB SCSI internal | 1127.79 |

### I-O MEGA

| | |
|---|---|
| Tape 250MB internal | 169.57 |
| Floptical 21MB internal | 379.27 |
| Bernoulli 150MB internal SCSI | 479.11 |
| Bernoulli 150MB internal IDE | 469.59 |
| Bernoulli 150MB PC Powered | 494.76 |
| Bernoulli 150MB Transportable | 568.26 |
| 90MB cartridge | 89.27 |
| 150MB cartridge | 92.80 |

### MICROSOLUTIONS

| | |
|---|---|
| Backpack 3.5" 1.44MB floppy parallel | 153.40 |
| Backpack 5.25" 1.2MB floppy parallel | 165.38 |
| Backpack 340MB HD parallel | 439.75 |
| Backpack 2X CD-ROM parallel | 344.44 |
| Backpack 250MB tape backup parallel | 299.90 |

### SyDOS

| | |
|---|---|
| Pro Note 42MB parallel | 289.77 |
| Puma 88MB parallel | 442.44 |
| 88MB w/16-bit adapter external | 539.81 |
| Puma 105MB parallel | 399.87 |
| Marlin 105MB IDE internal | 378.40 |

## TAPE, REMOVABLE & FLOPPY DRIVES

### Mountain

| | |
|---|---|
| TD-250 250MB IDE internal | 189.32 |
| FS8500 305MB IDE internal | 449.50 |
| SideCar II 305MB parallel | 358.77 |
| 1200-4 4GB SCSI external | 2045.39 |

## WYSE TERMINALS

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|---|---|
| Wyse 35 amber/green/white | 299.88 |
| Wyse 55 amber/green/white | 223.21 |
| Wyse 55 amber/green/white | 223.21 |
| Wyse 60 amber/green/white | 279.60 |
| Wyse 150 amber/green/white | 265.45 |
| Wyse 160 amber/green/white | 329.88 |
| Wyse 325 color | 427.40 |

## MULTIMEDIA, SOUND, CD

***Creative Labs***

| | |
|---|---|
| Discovery 16 CD 2X kit internal | 308.80 |
| Edutainment CD 2X kit internal | 433.55 |
| Game Blaster CD 2X kit internal | 399.80 |
| Multimedia Office CD 3X kit internal | 528.84 |
| Omni CD 3X kit internal | 365.45 |
| SoundBlaster value edition | 55.95 |
| SoundBlaster Pro value edition | 74.95 |
| SoundBlaster 16 value edition | 99.89 |
| SoundBlaster 16 MCD | 139.57 |
| SoundBlaster 16 ASP MCD | 167.79 |
| SoundBlaster 16 SCSI-2 | 168.88 |
| SoundBlaster 16 ASP SCSI-2 | 197.77 |
| SoundBlaster 16 AWE32 | 268.41 |
| WaveBlaster wavetable upgrade | 179.00 |

| | |
|---|---|
| Access SW Under a Killing Moon CD | 57.40 |
| Ensoniq Soundscape wavetable | 188.88 |
| Logitech SoundMan Wave | 185.89 |
| Media Magic CD 2X kit int. | 149.88 |
| Media Magic CD 2X kit int.w/DSP16 sound | 309.86 |
| Microsoft Bookshelf 1994 CD | 65.79 |
| Microsoft Cinemania 1994 CD | 52.88 |
| Microsoft Encarta 1994 CD | 85.24 |
| Microsoft Windows Snd System | 52.95 |
| Microsoft Windows Snd System w/board | 138.10 |
| Mitsumi CD 2X kit internal | 135.76 |
| Mitsumi CD 2X kit internal w/sound | 194.97 |
| Orchid SoundWave 32 SCSI | 194.82 |
| Orchid CD 2X kit internal w/sound | 349.85 |
| Sigma Designs RealMagic Lite | 291.30 |
| Sun Moon Star CD 2X kit internal | 146.79 |
| Sun Moon Star CD 2X kit internal w/sound | 238.64 |
| Turtle Beach Monterey sound card | 349.77 |
| Video Logic 928Movie VLB 1MB | 279.46 |

## CD-ROM & OPTICAL DRIVES

| | |
|---|---|
| Chinon CDS535 CD-ROM kit internal | 288.48 |
| Chinon CDX535 CD-ROM kit external | 349.64 |
| NEC 3Xi internal | 429.96 |
| NEC 3Xe external | 459.00 |
| NEC 3Xp portable | 379.00 |
| NEC 4X Pro | 697.80 |
| Pioneer DRM604X Quadraspin 6 disc | 1088.34 |
| Plextor 3028 240MS kit internal | 309.42 |
| Plextor 5028 240MS kit external | 419.27 |
| Plextor 4plex quad internal | 489.88 |
| Plextor 4plex quad external | 659.96 |
| Sony CDU-33A 2X CD-ROM internal | 129.86 |
| Sony CDU-55S 220ms internal SCSI | 219.84 |
| Sydos Parallel Port CD-ROM | 289.49 |
| Teac SuperQuad 4X internal | 388.44 |
| Toshiba 3401 SCSI CD-ROM external | 399.78 |
| Toshiba 3401 SCSI CD-ROM kit external | 529.80 |
| Toshiba 3401 SCSI CD-ROM internal | 289.94 |

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### HURTA®

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|---|---|
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### CalComp

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|---|---|
| DB III 12X12 4 button | 248.90 |
| DB III 12X12 16 button | 248.90 |
| DB III 12X18 pressure pen | 399.85 |
| Slate 12X12 16 button | 219.84 |

## PLOTTERS, DIGITIZERS & SCANNERS

### Canon

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|---|---|
| IX4015 color scanner | 899.00 |

### Summagraphics.

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|---|---|
| Summasketch III 12 X 12 16 button | 253.90 |
| Summasketch III 18 X 12 4 button | 524.44 |

### HOUSTON INSTRUMENT

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|---|---|
| HI 7100 A-D size 8 pen | 2497.73 |
| HI 7200 A-F size 8 pen | 3387.22 |

### HEWLETT PACKARD

| | |
|---|---|
| ScanJet IIP | 509.06 |
| ScanJet IIP document feeder | 269.93 |
| ScanJet IICX W/ISA interface | 995.50 |
| ScanJet IICX document feeder | 474.72 |
| ScanJet IICX transparency adapter | 633.26 |

### EPSON

| | |
|---|---|
| ActionScanner ES600C* | 694.25 |
| ES-1200-ProPC | 1237.36 |

*after $100 manufacturer rebate (9/1-12/31/94)

## VIDEO PRODUCTS

### VGA & SUPER VGA MONITORS

| | |
|---|---|
| Mag Innovision DX15F | 368.00 |
| Mag Innovision MX15F | 469.89 |
| Mag Innovision DX17F | 667.40 |
| Mag Innovision MX17F | 799.45 |
| Mag Innovision MX17FG | 829.85 |
| Mag Innovision MX21F | 1797.42 |
| Magnavox CM2089 14" .28 | 238.60 |
| Magnavox CM2099 14" .28 NI | 258.80 |
| Magnavox CM2015 15" 1024 | 296.89 |
| Magnavox CM4015 15" 1280 | 358.85 |
| Magnavox CM4017 17" .31 | 648.20 |
| Magnavox CM4018 17" .28 | 719.10 |
| Magnavox 20CM64 20" SPECIAL!* | 999.00 |

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|---|---|
| Nanao F340iW 15" | 646.98 |
| Nanao F550iW 17" | 977.43 |
| NEC 2V 14" | 328.86 |
| NEC 3V 15" | 467.49 |
| NEC 3FGe 15" | 556.90 |
| NEC 4FGe 15" | 616.90 |
| NEC 5FGe17" | 997.90 |
| NEC 5FGp 17" | 1093.20 |
| NEC 6FGp 21" | 1997.00 |
| Sony 15SF 15" | 447.92 |
| Sony 17SE1 17" | 969.88 |
| Sony 20SE1 20" | 1895.00 |

### VGA & SUPER VGA DISPLAY CARDS

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|---|---|
| ADS VGA to TV Elite internal | 138.82 |
| ADS VGA to TV Elite external | 198.83 |
| ATI Graphics Xpression ISA 2MB | 209.20 |
| ATI Graphics Xpression VLB 2MB | 209.20 |
| ATI Graphics Xpression PCI 2MB | 209.20 |
| ATI Graphics Pro Turbo ISA 2MB | 389.79 |
| ATI Graphics Pro Turbo VLB 2MB | 389.79 |
| ATI Graphics Pro Turbo PCI 2MB | 389.79 |
| ATI Graphics Pro Turbo PCI 4MB | 599.00 |
| Diamond SpeedStar Pro ISA 1MB | 95.69 |
| Diamond SpeedStar 64 ISA 2MB | 199.00 |
| Diamond Stealth 32 VLB 2MB | 174.99 |
| Diamond Stealth 64 VLB 2MB VRAM | 348.88 |
| Diamond Stealth 64 PCI 2MB VRAM | 348.88 |
| Hercules Dynamite Pro ISA 1MB | 159.89 |
| Hercules Dynamite Pro ISA 2MB | 197.48 |
| Hercules Dynamite Pro VLB 1MB | 149.36 |
| Hercules Dynamite Pro VLB 2MB | 197.48 |
| Hercules Terminator 64 PCI 2MB | 379.88 |
| Hercules Terminator 64 VLB 2MB | 379.88 |
| Intel Smart Video Recorder | 349.30 |
| Intel Smart Video Recorder Pro | 416.99 |
| Orchid Kelvin 64 ISA 1MB | 147.10 |
| Orchid Kelvin 64 ISA 2MB | 194.19 |
| Orchid Kelvin 64 VLB 1MB | 147.10 |
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T1960CT 200MB act color ........2988.92
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T2400CS 320MB dual color ........3039.89
T2400CT 250MB act color ........3597.75
T2400CT 320MB act color ........3768.83
T3400CT 120MB act color ........2298.56
T3600CT 250MB act color ........3989.00
T4700CT 200MB act color ........4428.55
T4700CT 320MB act color ........4699.80
T4800CT 500MB act color ........5399.44
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LC 4/50S 270MB ........1479.17
LC 4/66D 270MB ........1699.72
LC 4/66D 540MB ........1819.40
LC 4/66D 340MB CD ........1974.77
LC 4/100D 270MB ........2109.96
LC 4/100D 540MB ........2258.58
MT 4/66D 340MB ........1909.00
MT P60 270MB ........2199.88
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#### Canon

NoteJet 4/33 120MB mono ........1629.41
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ActionNote 500C 120MB+modem ........1698.92
ActionNote 500C 180MB+modem ........1973.99
ActionNote 700C 210MB pas clr ........2323.04

#### IBM ThinkPad Portables

510Cs 4/50SLC2 200MB pas color ........1799.00
360 4/33SX 170MB mono ........2003.38
360 4/33SX 340MB mono ........2438.31
360Cs 4/33SX 170MB pas color ........2535.67
360Cs 4/33SX 340MB pas color ........3008.88
360C 4/33SX 170MB act color ........3387.41
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PowerMate 4/33S 270MB ........1119.32
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Force Multimedia 5/60 420MB ........2405.05
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Force52 4/50SX 420MB MM ........1449.17
Force54 4/66 420MB MM ........1449.17
Force57 4/66 540MB MM ........1659.84

### COMPUTERS

#### TEXAS INSTRUMENTS

TM4000M 4/25SX 120MB adv pas clr ........2097.46
TM4000M 4/50SX 340MB act color ........3357.70
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TM4000M 4/75 455MB act color ........4477.96
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TM4000E 4/50 200MB act color ........2857.23
TM4000E 4/75 340MB act color ........3686.80
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ML321 ........427.40
ML380 ........214.95
ML395 ........987.32
ML395C ........1039.74
ML520 ........369.82
ML521 ........495.18
ML590 ........429.51
ML591 ........579.86
Pacemark 3410 ...1219.49
OL400E ........497.70
OL410E ........647.84
OL410E/PS 4ppm 600dpi ........938.64
OL810 ........905.50

#### Canon

BJ10SX ........244.88
BJ200E ........259.44
BJ230 ........388.00
BJC600 color ........499.00
BJC-4000 720dpi + color ........498.97
LBP430 300dpi 4ppm laser ........579.00
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DECwriter 500i inkjet ........357.00
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#### NEC

SuperScript 610 ........477.78
Silentwriter 640 ........734.60

#### Panasonic

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#### TEXAS INSTRUMENTS

microMarc Color inkjet ........378.83
microWriter basic ........485.61
microWriter PS23 ........654.32
microLaser Pro 600 PS23 ........1197.02
microLaser Pro 600 PS65 ........1524.25
microLaser Power Pro 600 PS65 ........1629.60

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JX9400 300dpi 4ppm laser ........398.88
JX9460PS 600dpi 6ppm laser ........793.36
JX9660PS 600 dpi 8 ppm laser ........1247.33

#### HEWLETT PACKARD

DeskJet Portable 310 w/CSF ........367.00
DeskJet 500C ........343.20
DeskJet 520 ........284.10
DeskJet 560C ........516.55
DeskJet 1200C ........1347.91
DeskJet 1200C PS ...2149.26
LaserJet 4L ........669.56
LaserJet 4P ........959.47
LaserJet 4MP ........1419.18
LaserJet 4 plus ........1478.25
LaserJet 4M plus ...1988.72
LaserJet 4SI ........2998.95
LaserJet 4SI MX ....4399.89

**COSTAR**

LabelWriter XL DOS/Win ........144.46
LabelWriter XL Plus DOS/Win ........224.89

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#### Maxtor

170MB IDE ........175.98
290MB IDE ........198.79
345MB IDE ........219.17
345MB SCSI ........249.60

#### MICROPOLIS

2210A 1050MB IDE ........734.97
2210 1050MB SCSI ........734.97
4110 1050MB SCSI ........669.65
2217 1.7GB SCSI ........1038.46
2210AV 1.050GB SCSI AV ........798.89
2217AV 1.765GB SCSI AV ........1099.22
1936 3GB SCSI ........2098.00

#### CONNER

210MB IDE ........194.64
425MB IDE ........239.55
540MB IDE ........307.98
850MB IDE ........439.38
1080MB IDE ........599.91

*All Conner drives listed include complete installation hardware and software.*

#### Seagate

130MB IDE ........187.81
200MB IDE ........183.32
261MB IDE ........201.65
341MB IDE ........236.28
427MB IDE ........228.76
1.0GB SCSI-2 ........658.63

**WESTERN DIGITAL**

Caviar 210MB IDE .179.89
Caviar 420MB IDE .233.67
Caviar 540MB IDE .299.00
Caviar 730MB IDE .465.73

**CONTROLLERS**

Acculogic IDE W/1PAR, 2SER, 1GAME ........35.06
Acculogic IDE W/BIOS ........48.90
Acculogic VLB IDE ........89.76
Adaptec AVA1505 SCSI-2 CD KIT ........54.95
Adaptec 1542CF SCSI-2 ........265.45
Adaptec 2742AT EISA SCSI-2 ........339.22
Adaptec 2842 VLB SCSI-2 ........257.23
Promise IDE ISA Cache ........94.50
Promise IDE VLB Cache ........115.29

### MODEMS & COMMUNICATIONS

#### USRobotics

**SPORTSTER MODEMS**

V.34 28.8K internal w/fax ........226.14
V.34 28.8K external w/fax ........244.32
14.4K internal w/fax ........117.50
14.4K external w/fax ........137.50

**COURIER MODEMS**

V.34 internal w/fax ........389.79
V.34 external w/fax ........427.84

#### Hayes

ACCURA 14.4 internal w/fax ........114.88
ACCURA 14.4 external w/fax ........138.89
ACCURA 28.8 V.FC internal w/fax ........209.02
ACCURA 28.8 V.FC external w/fax ........258.82
OPTIMA 14.4 external ........363.80
OPTIMA 14.4 external w/fax ........374.30
OPTIMA 14.4 pocket w/fax ........296.93
OPTIMA 28.8 V.FC external w/fax ........421.54

#### PRACTICAL PERIPHERALS

14.4 internal w/fax ........107.38
14.4 Mini Tower w/fax ........124.80
V.FC 28.8 internal w/fax ........228.20
V.FC 28.8 Mini Tower w/fax ........244.26
Practical Pro Series ........CALL!

#### intel

SatisFAXtion 200 internal ........209.50
SatisFAXtion 400 Super Fax Pack ........298.83
SatisFAXtion 400 external ........308.89
14.4 internal w/fax While Supplies Last! ........79.00
14.4 external w/fax While Supplies Last! ........109.00

#### BOCA

14.4 internal w/fax ........89.00
14.4 external w/fax ........113.61
V.FC 28.8 internal w/fax ........193.66
V.FC 28.8 external w/fax ........216.30

#### MICROCOM

Deskporte ES 14.4 ........184.56
Deskporte Fast ES V.FC 28.8 ........234.77
Deskporte Fast EP V.FC 28.8 ........244.30

#### MOTOROLA

FasTalk II 14.4K internal w/fax ........119.78
FasTalk II 14.4K external w/fax ........139.84

### BATTERY BACKUP AND UPS

**American Power Conversion**

BackUPS 280 ........99.53
BackUPS 400 ........159.94
BackUPS 450 ........189.99
BackUPS 600 ........264.24
BackUPS 900 ........374.88
BackUPS 1250 ........499.24
SmartUPS 400 ........299.69
SmartUPS 600 ........363.38
SmartUPS 900 ........514.61
SmartUPS 1250 ........644.24
SurgeArrest Network ........34.97
SurgeArrest Pro ........33.58
SurgeArrest Network + Phone ........48.65
Line-R 600 ........119.09

**Tripp Lite**

BC250 ........99.11
BC400 ........155.59
BC500 ........189.42
BC500 LAN ........198.65
BC600 LAN ........249.00
BC750 LAN ........313.90
BC900 LAN ........359.67
BC1250 LAN ........459.10

**Tripp Lite Smart UPS Series**

SMART 250 LAN ........226.81
SMART 400 LAN ........279.22
SMART 500 LAN ........286.21
SMART 600 LAN ........311.26
SMART 750 LAN ........379.86
SMART 900 LAN ........439.81
SMART 1250 LAN ........579.00
Isobar 4 OUTLET ........38.95
Isobar 6 OUTLET ........46.38

### PCMCIA

3Com Etherlink II combo ........246.15
DSP Tech Portable Sound+ ........154.34
Hayes OPTIMA 14.4 data/fax ........218.76
IBM Token Ring 16/4 ........423.15
Linksys Ethernet combo ........167.56
Linksys Ethernet 10BT ........175.15
Maxtor MobileMax 105MB HD ........339.54
Megahertz 14.4 data/fax ........216.70
Megahertz 9600 data/fax XJack ........179.70
Megahertz 14.4 data/fax XJack Gold ........229.00
Motorola 14.4 data/fax w/cellular ........319.05
National Semi NE4100T ethernet 10BT ........172.96
New Media Bus Toaster SCSI-2 host ........229.42
New Media Wave Jammer sound card ........252.61
Trantor Slim SCSI-2 ........279.45
Turtle Beach Audio Advantage ........129.38
USR WorldPort 14.4K data/fax ........197.18
Xircom Ethernet 10BT ........184.71
Xircom Ethernet coax ........215.92
Xircom Ethernet combo ........233.65
Xircom Token Ring 16/4 ........449.18

### PROCESSOR/UPGRADES

Cyrix 486DRX/2 Upg 40Mhz ........247.44
Intel OverDrive SX2/50 ........193.25
Intel OverDrive DX2/50 ........239.82
Intel OverDrive DX2/66 ........285.95
Kingston 486/NOW 33MHz ........255.52
Kingston 486/NOW 33MHZ ........369.32

### MEMORY UPGRADES

**CDW® Features Delkin, Kingston, Pacific Data and Simple Technology Memory.**

AST BRAVO 486LC 2MB ........CALL!
AST POWEREXEC 486 4MB ........CALL!
AST PREMMIA 8MB UPG ........CALL!
COMPAQ DESKTOPS-ALL MODELS ........CALL!
COMPAQ CONTURA 486 8MB ........CALL!
COMPAQ CONTURA 4MB ........CALL!
COMPAQ LITE 4/25C 4MB ........CALL!
EPSON ACTION LASER 2-8MB ........CALL!
HP DESKJET 500 & 500C 256KB ........CALL!
HP LASERJETS-ALL MODELS ........CALL!
HP PAINTJET XL300 4MB ........CALL!
IBM DESKTOPS-ALL MODELS ........CALL!
IBM THINKPAD 700 4MB ........CALL!
NEC SILENTWRITER 95 2MB ........CALL!
NEC VERSA 4MB ........CALL!
OKILASER 400 2MB ........CALL!
OKILASER 800 2MB ........CALL!
PANASONIC 4410, 4430 2-4MB ........CALL!
PANASONIC P4450I 2MB ........CALL!
TI MICROLASER 1MB ........CALL!
TI TM4000 4MB ........CALL!
TOSHIBA NOTEBOOKS-ALL MODELS ........CALL!

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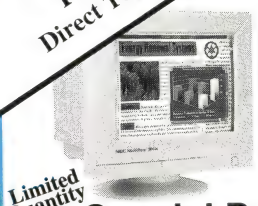
Circle 68 on reader service card

# USA Flex...Your

★★★★½ PC/Computing Direct Top 60, July 1994

## NEC



Energy Star — EPA POLLUTION PREVENTER

Best Buy Award Monitors USA Flex NEC 5FG

Limited Quantity

### Special Purchase!

**Demo/Showroom/ Factory-Reconditioned Models**

**All include Full 1 Year Warranty**

| | |
|---|---|
| MultiSync 3FGe | $439 |
| MultiSync 4FGe | $529 |
| MultiSync 5FGe | $699 |
| MultiSync 6FGe | $1299 |

## COMPAQ

### LTE Lite/25E

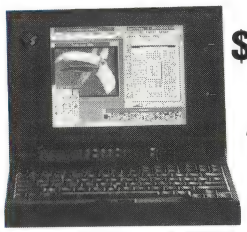
*At Our Lowest Prices Ever!*

The **Compaq LTE Lite 25E** features Intel 386SL-25MHz processor, 64K Cache, 4MB RAM (Max. 20MB), 8.5"x 11"x 2", 6.3 lbs., 9.5" high contrast active matrix mono LCD, MS-DOS, Windows & Integrated TrackBall

Limited Quantity

| | |
|---|---|
| **LTE Lite/25E** 84MB Hard Drive | $949 |
| **LTE Lite/25E** 120MB Hard Drive | $999 |
| **Contura Aero 4/33C** 170MB Hard Drive | $1679 |
| **Contura Aero 4/33C** 250MB Hard Drive | $1869 |

## IBM *ThinkPad® 500* Major Price Reduction!



Starting At... **$799**

*Ask Your Sales Consultant For Specific Model Features*

| | |
|---|---|
| **ThinkPad 350C** 125MB | $1599 |
| **ThinkPad 350C** 250MB | $2199 |
| **ThinkPad 500** 85MB | $799 |
| **ThinkPad 500** 170MB | $999 |
| **ThinkPad 510Cs** 200MB | $1799 |
| **ThinkPad 360** 170MB/340MB | $1999/$2499 |
| **ThinkPad 360CS** 170MB/340MB | $2599/$3099 |
| **ThinkPad 360C** 170MB/340MB | $3499/$3999 |

NEW — 3 Year Warranty with FLEX Express parts replacement

## *FLEX PT60*

### Pentium™ Multimedia System

All For Only **$2995**

Now Includes **COREL CD POWER PAK** including
- **Caching Software** — *Speeds up your CD-ROM drive*
- **System Browser** — *For CD-ROM troubleshooting*
- **Photo CD Lab** — *Use photo image screen savers & transform photo CD images*
- **CorelMOSAIC** — *Organize & view graphic and photo files*
- **CD-Audio Software** — *Record to your hard drive and edit sound clips*

**★FLEX PT60 60MHz System**
- Genuine Intel Pentium 60MHz 64bit Processor.
- 256K Ultra-fast "Writeback" Cache Memory
- 8MB RAM, Maximum 128MB on System Board
- 3.5" (1.44MB) Floppy Drive
- 540MB IDE Hard Drive w/ 28K Cache
- 15" .28 NI SVGA 1024x768 *FLEXVISION* MultiScan Monitor

**★Hewlett-Packard DeskJet 550C Printer**
**★SONY/Sound Blaster CD-ROM Bundle**
- Sony Double-Spin Internal CD-ROM Drive,
- Creative Labs Sound Blaster 16 Audio Board • 8 CD-ROM Discs

**★Microsoft Software and Accessories**
- Microsoft DOS 6.2 • Windows for Workgroups 3.11
- MSWorks for Windows • MS Money • MS Sound Bytes
- MS Entertainment Pack • FREE Accessories Kit

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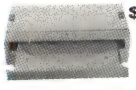
**★14.4 Data/Fax Modem**
- 57,000bps S/R data; up to 14,400 bps S/R Fax, V.32bis V.42bis

## Create Your Own Multimedia

### 1 Choose Your CD-ROM Drive...

Free CD included with either kit

**FLEX CD-PRO STARTER** — $149 — *CDPRO1*



Double Spin Internal CD-ROM drive with interface card and instructions • 320ms access time • 300KB/sec transfer rate • multi-session Kodak PhotoCD Compatible.

**FLEX CD-PRO CLASSIC** — $249 — *CDPRO3*

**Sony Double Spin Int. drive**
- 320ms access time
- 300KB/sec transfer • 64KB buffer

**Sound Blaster 16 Sound Card**
- 16-bit stereo sampling & playback
- 20-voice • ASP and WaveBlaster upgradable. *Speakers required.*

### 2 Choose Your CD-ROMs...

1 Free CD is included with either Kit sold above PLUS Buy any 3 more CD-ROMs for only $49! (Ask your sales rep for selection of CD-ROM titles.)

### 3 Choose Your Speakers...

Select from models by Sony, Jensen, Labtech, Altec Lansing, Panasonic & more!

**Ask your Flex consultant for details about this Multimedia offer**

## PRINTERS

### HEWLETT-PACKARD

| | |
|---|---|
| HP DeskJet 520 - New 600 DPI | $285 |
| HP DeskJet 500C - Color | $345 |
| HP DeskJet 550C - Color | $429 |
| HP DeskJet 560C - New Color | $559 |
| HP DeskJet 1200C - Color | $1349 |
| HP DeskJet 310 - Portable | $299 |
| HP LaserJet 4L - New at Flex | $599* |
| HP LaserJet 4P - New at Flex | $949 |

*Includes $50 Rebate thru 12/31/94

### EPSON

**LASER PRINTERS**

| | |
|---|---|
| ACTION LASER 1100/1500 | $479/$649 |
| ACTION LASER 1600 | $944 |

**DOT MATRIX PRINTERS**

| | | | |
|---|---|---|---|
| AP 2250 | $124 | LQ-1170 | $598 |
| LX300 | $164 | LQ-2550 Clr. | $899 |
| AP 3250 | $162 | DFX-5000+ | $1319 |
| AP 3260 | $177 | DFX-8000 | $2249 |
| LQ-570+ | $239 | Stylus 300 | $199 |
| FX-870 | $268 | Stylus 400 | $234 |
| FX-1170 | $349 | Stylus 800+ | $215 |
| LQ-1070+ | $364 | Stylus 1000 | $439 |
| LQ-870 | $439 | Stylus Color | $558 |

### PANASONIC

**LASER PRINTERS**

| | | | |
|---|---|---|---|
| KX-P4410 | $469 | KX-P5400 | $684* |
| KX-P4400 | $384* | KX-P4440 | $989 |
| KX-P4430 | $659 | | |

**DOT MATRIX PRINTERS**

| | | | |
|---|---|---|---|
| KX-P1150 | $129 | KX-P2135 | $195* |
| KX-P2023 | $179 | KX-P1624 | $369 |
| KX-P2124 | $309 | KX-P3124 | $319 |
| KX-P2130 | $169* | KX-P3624 | $399 |

*Includes Rebates. See Panasonic feature on facing page for details

### CANON

**BUBBLE JET PRINTERS**

| | |
|---|---|
| BJ-10SX / 100 | $245/$229 |
| BJ-200e / 230 | $284/$389 |
| BJC-600 | $499 |
| LBP-430 / 860 | $579/$1299 |

## PRINTERS (cont.)

### TEXAS INSTRUMENTS

| | |
|---|---|
| microMarc™/ Color | $229 / $379 |
| microWriter PS23/PS65 | $679/$799 |
| microLaser Pro 600 PS23/PS65 | $1199/$1529 |
| Pro 600 imaging cartridge | $159 |

### OKIDATA

| | |
|---|---|
| OL400E | $498 |
| OL410E | $648 |
| Microline 320/321 | $299/$429 |
| Microline 590/591 | $424/$584 |

## MONITORS

### NEC

| | | | |
|---|---|---|---|
| 14" SVGA | $309 | 15" 4FGe | $617 |
| 14" 2V | $329 | 17" 5FGe | $998 |
| 15" 3V | $469 | 17" 5FGp | $1094 |
| 15" 3FGe | $557 | 21" 6FGp | $1998 |

### CTX

| | |
|---|---|
| 14" .39mm | $199 |
| 14" .28mm int./ E Star & MPR-II | $239/$249 |
| 14" .28mm NI/ E Star & MPR-II | $289/$295 |
| 15" .28mm int./.28 NI | $319/$339 |
| 17" .28 NI | $649 |

### MAG Innovision

| | |
|---|---|
| 14" LX1450LG | $269 |
| 15" DX15F/MX15F-L | $369/$479 |
| 17" DX17F/MX17F-L | $669/$899 |
| 21" MX21FG | $1799 |

### SONY

| | |
|---|---|
| 15" CPD-15SF | $459 |
| 17" GDM-17E1 | $999 |
| 20" GDM2036S | $1899 |
| 20" GDM2036SE1 | $1949 |
| Universal MAC cable adaptor | $17.95 |

## VIDEO CARDS

### ATI Technologies

| | |
|---|---|
| GRAPHICS ULTRA+ 2MB | $209 |
| GRAPHICS ULTRA™ PRO 2MB ISA/VLB/EISA | $279/$279/$309 |

## VIDEO CARDS

### DIAMOND

| | |
|---|---|
| SPEEDSTAR PRO 1MB ISA/VLB | $109/$109 |
| SPEEDSTAR 64 ISA 1MB/2MB | $159/$199 |
| SPEEDSTAR 64 PCI 1MB/2MB | $145/$189 |
| STEALTH 32 VLB 1MB/2MB | $165/$209 |
| STEALTH 64 VLB 2MB/4MB | $379/$519 |
| VIPER 2MB VLB/PCI | $339/$349 |

### HERCULES

| | |
|---|---|
| Stingray VLB/PCI 1MB | $99 |
| Dynamite Pro ISA 2MB | $199 |
| Dynamite Pro VLB 2MB | $189 |
| Dynamite Power 2MB VLB/PCI | $209/$209 |
| Graphite Power ISA 1MB/2MB | $229/$349 |
| Graphite Power VLB 1MB/2MB | $199/$289 |
| Graphite Terminator VLB/PCI 2/4MB | CALL |

### ORCHID

| | |
|---|---|
| KELVIN 64 1MB ISA/VLB/PCI | $175 |
| KELVIN 64 2MB ISA/VLB/PCI | $225 |

## MODEMS

| | Int./Ext. |
|---|---|
| **HAYES** | |
| PCMCIA Optima 144 + Fax | $199 |
| ACCURA 24 | $85 |
| ACCURA 144+fax144 | $115/$139 |
| ACCURA 288 V.FC+fax | $199/$259 |
| Optima 144+ fax144 | $369/$369 |
| Optima 288 V.FC+fax | $359/$419 |
| **US ROBOTICS** | |
| PCMCIA World Port 14,400 FAX | $199 |
| Sportster 14.4 FAX | $119/$139 |
| World Port 14,400 FAX/Data Pocket | $229 |
| Courier V.Fast 28.8k data/14.4 fax | CALL |
| **BOCA** | |
| BocaModem 14.4K Fax | $89/ $115 |
| BocaModem Pocket 14.4K Fax | $169 |
| V.Fast Class Boca Modem | $135/$165 |

## NOTEBOOKS

### SHARP

| | |
|---|---|
| PC866O 8.4" Active color, 200MB | $2799 |
| PC8650-II 9.5" Active color, 200MB | $3495 |

## NOTEBOOKS

### EPSON

| | |
|---|---|
| ActionNote 4SLC/33 170MB, 24/96 Modem | $1359 |
| ActionNote 4SLC2-50 260MB, 24/96 Modem | $1599 |
| ActionNote 500C 120MB 24/96Modem | $1649 |
| ActionNote 500C 180MB 24/96Modem | $1929 |
| ActionNote 500C 260MB, 14.4 Modem | $2019 |
| ActionNote 700C 210MB | $2279 |
| ActionNote 700Cx 260MB | $2729 |

### TOSHIBA

| | |
|---|---|
| T1910/1910CS 200MB | $1459/$1999 |
| T1960CS 200 MB | $2349 |
| T1960CT 200 MB | $2999 |
| T2400CS 250MB | $2879 |
| T2400CT 250MB | $3599 |
| T3400/T3400CT 120MB | $1689/$3399 |
| T4700CT 200MB/320MB | $4439/$4769 |
| T4800CT 500MB | $5489 |
| T6600C, C/CD | $6129/$6599 |

### TEXAS INSTRUMENTS

| | |
|---|---|
| TravelMate 4000E WinSX/25 Mono 120MB | $1729 |
| WinDX2/40 Pass. Color 200MB | $2089 |
| WinDX2/50 Dual Scan Color 200MB | $2359 |
| WinDX2/50 Act. Matrix Color 200MB | $2859 |
| WinDX2/75 8.4"Active Matrix Color 340MB | $3949 |
| WinDX2/75 9.5"Active Matrix Color 455MB | $4459 |
| TM4000 M Mono 120MB HD | $1849 |
| TM4000 M Adv. Pass. Color 120MB HD | $2099 |
| TM4000 M Active Matrix Color 200MB HD | $2939 |
| TM4000 M Active Matrix Color 340MB HD | $3359 |
| TM4000 M Active Matrix Color 344MB HD | $4959 |

**USA FLEX** — Code # WD1104

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# Complete Computer Source!

## Panasonic Office Automation

*Special Rebates From Panasonic!*

### KX-P4400 SideWriter

Upright design and small .52 square footprint, 4 ppm, 300 dpi laser quality output,100-sheet paper tray, 1MB RAM exp.to 4.5MB, 28 Internal Bitmap Fonts, 1 yr. limited parts and labor warranty 5 years on printheads. *B1-P4400*

| | |
|---|---|
| USA Flex Price | $449 |
| Mail in Rebate | -$50 |
| Free Toner kit | -$15 |
| Your Price | $384* |

### KX-P5400 SideWriter

- Adobe PostScript Level 2 with 17 Adobe fonts
- 2MB RAM expandable to 4MB

| | |
|---|---|
| USA Flex Price | $799 |
| Mail in Rebate | -$100 |
| Free Toner kit | -$15 |
| Your Price | $684* |

*B1-P5400*

### KX-P2130 and KX-P2135 Color

$30 Rebate off the Panasonic KX-P2130
$50 Rebate off the KX-P2135

High speed output of up to 250 CPS, 360x360 dpi, Setup disk for easy control of all features & Windows 3.1 driver included, 24-pin, 250-draft, 7 fonts, 83 LQ, Limited 2 year warranty parts and labor.

**KX-P2130**

| | |
|---|---|
| USA Flex Price | $199 |
| Mail in Rebate | -$30 |
| Your Price | $169* |

**KX-P2135 Color**

| | |
|---|---|
| USA Flex Price | $245 |
| Mail in Rebate | -$50 |
| Your Price | $195* |

* Mail in Rebates Ends December 31,1994

## digital

### DECwriter 65

- 24-Wire Color Dot Matrix
- Print Speed Up To 240 CPS
- 50 Sheet Built-In Feeder
- Easy Start Software Gets You Up And Running
- Custom Windows 3.1 Driver for Optimized Performance
- 2-Year Warranty

*RT-LA65-CA*

### DECColorwriter 520ic

*RT-LJ520-CA*

- Color InkJet Printer
- Print Speed Up To 400 CPS
- High-Quality 300 DPI
- 150 Sheet Built-In Feeder
- Prints on Plain Paper, Labels, Transparencies, and Envelopes
- 2-Year Warranty

### DEClaser 1152

*LN07C-CA*

- Up to Three Active I/O Ports Serial, Parallel, & AppleTalk
- PostScript Level 2 & HP PCL4
- Canon LX Print Engine
- 2MB of Memory (Max. 4MB)
- 17 Adobe Type 1 Fonts, Upgradeable to 43
- 2-Year Warranty

### DEClaser 5100

*LN09C-CA*

- Faster Printing Via RISC Processor & Co-Processor
- PostScript Level 2 & Enhanced PCL5
- Optional Ethernet Protocols Card
- Optional Hard Disk & PCMCIA Memory Cards
- Optional 1200 DPI
- 2-Year Warranty

## EPSON

### Stylus COLOR Ink Jet Printer

720 dpi COLOR

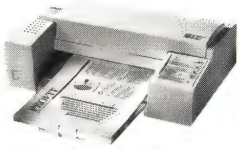
**$558**
*B1-EPSCOLOR*

- **Built-in 720 dpi Resolution Full-Color printing**
- NEW MicroWeave Technology: reduce banding in images
- NEW Microfeed feeds paper more accurately to reduce dot overlap
- Exclusive MACH ink jet technology
- 5 letter quality and 4 scalable fonts
- 2 year limited warranty W/Toll-Free tech. support

| | |
|---|---|
| Black Ink Cartridge *B2-S020034* | $14.95 |
| Color Ink Cartridge *B2-S020036* | $31.95 |
| 360 dpi Coated Paper (200 Shts) *B2-S041028* | $18.95 |
| 720 dpi Coated Paper (200 Shts) *B2-S041029* | $21.95 |

### Stylus 800+ Ink Jet Printer

- NEW MicroWeave Technology: reduce banding in grayscale images
- NEW Microfeed feeds paper more accurately to reduce dot overlap
- Exclusive MACH ink jet technology
- Crisp, 360 dpi
- Up to 165 cps letter quality (250 cps draft)
- 6 ltr quality & 4 scalable fonts
- 2 year limited warranty W/Toll-Free tech. support hotline from Epson



**$215**
*B1-EPS800+*

Additional Ink Cartridge *B2-S020025* ..... $18

## Canon

NEW Lower Prices

### Canon BJC-600 Bubble Jet Printer™

2 Year Limited Warranty

- 360 dpi • 60KB buffer
- 7 fonts
- 340 cps (20 cpi)
- Parallel I/F
- 100-sht. sheet feeder
- 9.9 lbs. • Narrow carriage
- 64-nozzle x 4 print heads

*B1-BJC600* **$499**

### Canon BJ-200e Bubble Jet Printer™

- 360 dpi
- 49KB buffer
- 20 TrueType fonts
- 4 ppm
- 256 Shades
- 100-sht. sheet feeder
- Up to 15 envelopes

*B1-BJ200E* **$284**

## HEWLETT® PACKARD

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*Great Performance, Exceptional Value!*

HEWLETT® PACKARD
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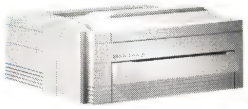
### HP LaserJet 4L Printer

$50 Rebate



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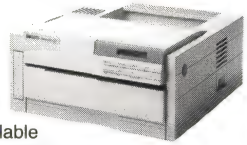

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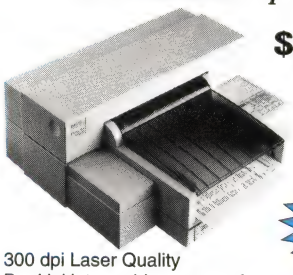

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2x36-60/70/80(8mb) **$325/309/299**
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8x36-70/80 (32mb) **$1299/1175**

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1x1-70/80 **$6**

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**CACHE**
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128x8-15/20/25 **$30/35**

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**MAXTOR**
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MEMORY FOR IBM & APPLE

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| 1Megx1 | – | 6.85 | 6.45 | 5.95 | 4.95 |
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| 1Megx4 (Zip Pk) | – | 24.00 | 22.00 | 21.00 | – |
| 256x4(Page Dip) | – | 7.25 | 6.75 | 6.50 | 5.95 |
| 256 4(Static Dip) | – | – | 9.95 | – | – |
| 256x4(Page Zip) | – | 9.25 | 9.00 | 8.95 | – |
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| 256x8(SOJ) | – | CALL | – | – | – |
| 256 x1 | – | 3.25 | 2.95 | 2.75 | 2.25 |
| 64x4 | – | – | – | 3.75 | – |
| 64x1 | – | – | – | – | 2.00 |
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| 256x16 Video Zip | – | – | CALL | – | – |
| Dual write enable Pac. Bell | | | | | |

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| | |
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| 8087-2 | 45.00 |
| 8087-1 | 79.00 |
| 80287-XL | 49.00 |
| 80387-16 DX | 39.00 |
| 80387-20 DX | 44.00 |
| 80387-DX (Does All) | 74.00 |
| 80487-SX (Does All) | 299.00 |
| Intel SX (Does All) | 69.00 |
| Intel SL Mobil | 69.00 |
| Intel 16SX | 39.00 |
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Call for overdrive chips

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| Ambra N Series | 4/8/12/16 Meg | 189.00/379.00/569.00/829.00 |
| Ambra SN Series | 4/16 Meg | 189.00/829.00 |
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- **Compatible with DOS, Windows, 3-X, OS/2 1.3 and 2.x**
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| CX486 SRX2 16/32 | 244.00 |
| CX486 SRX2 20/40 | 244.00 |
| CX486 SRX2 25/50 | 269.00 |

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| | 40NS | 50NS | 60NS | 70NS | 80NS | 100NS |
|---|---|---|---|---|---|---|
| 1Meg x 9 (3 chip) | – | 49.00 | 44.00 | 43.00 | 41.50 | – |
| 1Meg x 9 (9 chip) | – | – | 46.00 | 45.00 | 43.00 | 39.00 |
| 4Meg x 9 | – | – | 162.00 | 158.00 | 149.00 | – |
| 16Meg x 9 (9 chip) | – | – | – | 679.00 | – | – |

## 72 PIN SIMMS (EISA)

| | | | | | | |
|---|---|---|---|---|---|---|
| 256 x 36 1 mg | – | – | – | – | 59.00 | – |
| 512 x 36 2 mg | – | – | – | 96.00 | 94.00 | – |
| 1 meg x 36 4 mg | – | – | 184.00 | 174.00 | 174.00 | – |
| 2 x 36 8 mg | – | – | 359.00 | 339.00 | 339.00 | – |
| 4 x 36 16 mg | – | – | 689.00 | 669.00 | 669.00 | – |
| 8 x 36 32 mg | – | – | 1459.00 | 1419.00 | – | – |
| 16 x 36 64 mg | – | – | 2806.00 | 2745.00 | – | – |
| 1 x 32 4 mg | – | – | 174.00 | 164.00 | – | – |
| 2 x 32 8 mg | – | – | 339.00 | 319.00 | – | – |
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| | 8Meg | 500987-003 | | 330.00 |
| | 16Meg | 500987-004 | | 619.00 |
| | 32Meg | 500987-005 | | 1399.00 |
| Premium 486/25, 25E, 33, 33E | | | | |
| Premium 386/33TE, 486/25TE, 33TE | | | | |
| Prem. Serv., Prem II 386SX/20, 25 | | | | |
| Prem. II 386/25, 386/33, 486/33, 486SX/20 | 8Meg | 500780-001 | 64 pin | 398.00 |
| Premium 386/33T, Prem. 3868X/16 | | | | |
| Prem. II 386SX/20, 25 | | 500780-004 | | 189.00 |
| Premium 386/25, 33, 386/33T, 386SX/16, | | 500780-003 | | 59.00 |
| Prem. II 386SX20,25 | | 500780-001 | | 59.00 |
| Premia 4/33S, 4/33, 4/50D, 4/66D | 8Meg | 501159-002 | | 379.00 |
| Premia | 16Meg | 501159-003 | | 789.00 |
| Premia | 32Meg | 501159-004 | | 1469.00 |
| Premia | 64Meg | 501159-005 | | 3111.00 |
| AST Cupid Bd | 0–32Meg | 500818-001 | | 179.00 |

## ZENITH MEMORY MODULES

| MODEL | AMT. UPGRADED | AST PART # | PRICE |
|---|---|---|---|
| Z386/33, 25, 20, 33E | 1Meg | ZA3800ME | 59.00 |
| Z386/33, 25, 20, 33E, 486/25E | 4Meg | ZA3800MK | 180.00 |
| Z386SX | 2Meg | Z-605-1 modules | 119.00 |

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| 30F5380 (2Meg) | 30-286, 25-286, 50 MTHR BD. | 104.00 |
| 6450375 (1Meg) | 80-041 | 79.00 |
| 6450379 (2Meg) | 80-111, 311-121, 321, 081, 161 | 84.00 |
| 6451060 (4Meg) | 80-A21, A-61, 80-A31, 80-111, 80-311 | 189.00 |
| 6450604 (2Meg) | 70-061, 661, 121, 502, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX | 89.00 |
| 6450608 (2Meg) | 70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX, Val Pt. 325T | 90.00 |
| 78X8955 (128K) | 25 | 35.00 |
| 34F2933 (4Meg) | 35SX, 40SX, 55SX, 65SX, 55LS, 65LS | 175.00 |
| 8779977 (4Meg) | 55SX, 55LS, 65SX, 40SX, 35SX, 35LS | 175.00 |
| 1057035 (512K) | P/S1-286 | 49.00 |
| 92F9935 (2Meg) | P/S1 & P/S1/386SX-2121 | 109.00 |
| 92F9694 (4Meg) | P/S1 & P/S1/386SX, Model-2121 | 189.00 |
| 92G7200 (4Meg) | PSI Expert, Consultant, Willow | 175.00 |
| 92G7201, 73G3131 (4Meg) | Value Point Performance, PC Server 4/66 | 175.00 |
| 92G7203 (8Meg) | Value Point Performance, PC Server 4/66 | 339.00 |
| 92F7204 (16Meg) | Value Point Performance, PC Server 4/66 | 629.00 |
| 92G7205 (32Meg) | Value Point Performance, PC Server 4/66 | 1459.00 |
| 96F9290 (4Meg) | Standard 1x3-70 Simms | 172.00 |
| 96F9291 (16Meg) | Standard 4x9-70 Simms | 672.00 |
| 6450902 (2Meg) | 56, 57, 57SX,90, 95, P-75, 57SLC | 90.00 |
| 60G1622 (16Meg) | Value Point 77 486DX2, 486SX, SVR 85 | |
| 6450128 (4Meg) | P/S/1, Value Point Pert | 699.00 |
| | 57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Mod-2123, 2133, 2155, Val Pt 77, 486CS2, 486SX, SVR85 | 175.00 |
| 6450129 (8Meg) | Value Point 77 486DX2, 486SX, SVR 85 | |
| 6450130 (8Meg) | 355X, 40SX | 339.00 |
| | 56, 57, 57SX, 90, 95, P-75, 57SLC | 339.00 |
| 6451158 (4Meg ecc) | Value Point 77 486DX2, 486SX, SVR 85 | |
| 6451159 (8Meg ecc) | 486; 95XP; 95A (Install in pairs) | 199.00 |
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| 8189113 (16Meg) | Thinkpad 510CS (3.3 volt) | 869.00 |
| 79F0999 (2Meg) | LX40, N33SX, PS Note | 103.00 |
| 79F1000 (4Meg) | LX40, N33SX, PS Note, Tkpd 350, 350c, PS Note 425 | 189.00 |
| 79F1001 (8Meg) | LX40, N33SX, PS Note | 369.00 |
| 07G1411 (4Meg) | Thinkpad 750, 750c, 755 360 | 209.00 |
| 07G1416 (8Meg) | Thinkpad 750, 750c, 755 360 | 389.00 |
| 66G0094 (16Meg) | Thinkpad 750, 750c, 755 360 | 849.00 |
| 07G1420 (4Meg) | CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C | 209.00 |
| 07G1421 (8Meg) | CL57LSX LpTp, Thinkpad 700, 700C, 720, 720C | 389.00 |
| 60G0378 (8Meg) | Thinkpad 350, 350c, PS Note 425 | 339.00 |
| 60G0379 (16Meg) | Thinkpad 350, 350c, PS Note 425 | 649.00 |
| 92F8804 (2Meg) | N45SL | 109.00 |

## COMPAQ MEMORY MODULES

| MODEL | AMT. UPGRADED | CMPQ PART # | PRICE |
|---|---|---|---|
| DeskPro 386/33, 386/33L, 486/25, 486/33L, 486/50L, System Pro | 2Meg Module | 115144-001 | 109.00 |
| | 8Meg Module | 116561-001 | 399.00 |
| | 32Meg Module | 116568-001 | 1399.00 |
| DeskPro 386/33L, 486/33L | (Exp Bd) | 116569-001 | 279.00 |
| DeskPro 386/25, 386/20 | 1Meg Module | 113131-001 | 79.00 |
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| DeskPro 386S-16MHz | 1Meg Exp Bd | 113633-001 | 149.00 |
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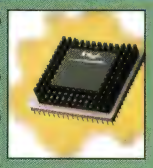

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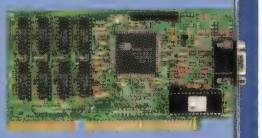

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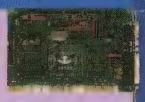

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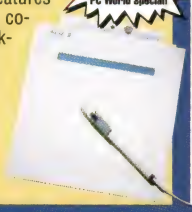

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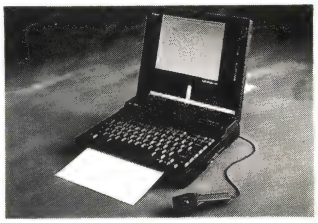

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| ST11950N | 1.6GB | 08MS | 3.5" | Fast SCSI-2 | 1199 |
| ST12550N | 2.1GB | 08MS | 3.5" | Fast SCSI-2 | 1299 |
| ST15150N | 4.2GB | 08MS | 3.5" | Fast SCSI-2 | 2699 |

## WESTERN DIGITAL

**FACTORY NEW- 3 YEAR WARRANTY**

| | | | | | |
|---|---|---|---|---|---|
| AC2340 | 2340MB | 12MS | 3.5X1 | IDE | $215 |
| AC2420 | 420MB | 12MS | 3.5X1" | IDE | 225 |
| AC2540 | 540MB | 11MS | 3.5X1" | IDE | 315 |
| AC2700 | 730MB | 10MS | | IDE | 425 |
| AC31000 | 1083MB | 10MS | | IDE | 599 |

## MICROPOLIS

**FACTORY NEW- 5 YEAR WARRANTY**

| | | | | | |
|---|---|---|---|---|---|
| 4110A | 1.0GB | 10MS | 3.5" | IDE | $645 |
| 2217A | 1.75GB | 10MS | 3.5" | IDE | 895 |
| MC4110 | 1.2GB | 9MS | 3.5X1" | SCSI-2 | 645 |
| MC2217 | 1.75GB | 10MS | 3.5" | SCSI-2 | 895 |
| MC1936 | 3.0GB | 11MS | FH | SCSI-2 | 1895 |
| MC4410 | 4.1GB | 8MS | 3.5" | SCSI-2 | CALL |
| MC1991 | 9.0GB | 11MS | FH | SCSI-2 | CALL |

**THESE DRIVES ARE FINE TUNED FOR AUDIO & VIDEO APPLICATIONS**

| | | | | |
|---|---|---|---|---|
| MC2210AV | 1.0GB | 10MS | SCSI-AV | 749 |
| MC2217AV | 1.7GB | 10MS | SCSI-AV | 999 |
| MC1936AV | 3.0GB | 11MS | SCSI-AV | 2119 |

**MICRODISK/EXTERNAL SUBSYSTEMS STACKABLES**

| | | | | |
|---|---|---|---|---|
| MICRODISK LT | 1.0GB | 10MS 3.5" | PC/MAC | $1249 |
| MICRODISK LT | 1.7GB | 10MS 3.5" | PC/MAC | 1549 |
| MICRODISK AVLT | 1.0GB | 10MS 3.5" | PC/MAC | 1389 |
| MICRODISK AVLT | 1.7GB | 10MS 3.5" | PC/MAC | 1689 |
| MICRODISK LS | 3.0GB | 13MS 3.5" | PC/MAC | 2989 |

## CONNER®

**FACTORY NEW- 1 YEAR WARRANTY**

| | | | | | |
|---|---|---|---|---|---|
| CFA210A | 210MB | 14MS | 3.5" 1" | IDE | $170 |
| CFA420 | 420MB | 13MS | 3.5" 1" | IDE | 245 |
| CFA540A | 540MB | 12MS | 3.5" 1" | IDE | 335 |
| CP540P | 540MB | 12MS | 3.5" 1" | SCSI | 340 |
| CFA810A | 810MB | 10MS | 3.5" 1" | IDE | 495 |
| CP1060S | 1.0GB | 9MS | 3.5" 1" | SCSI | 640 |
| CP1060W | 1.0GB | | FAST WIDE | SCSI | 650 |
| CFA1080A | 1.08GB | 10MS | 3.5" 1" | IDE | 599 |
| CFP2120 | 2.12GB | 10MS | 3.5" | SCSI | 1250 |

## MicroSolutions

| | | | |
|---|---|---|---|
| BACKPACK | 210MB | PARALLEL PORT INTERFACE | $329 |
| BACKPACK | 340MB | PARALLEL PORT INTERFACE | 429 |

## Quantum™

**FACTORY NEW - 2 YEAR WARRANTY**
**5 YR WARN. ON P DRIVES/1 YR. WARN. ON 2.5" DRVS.**

| | | | | | |
|---|---|---|---|---|---|
| LPS270 | 270MB | 12MS | 3.5X1" | IDE | $215 |
| LPS340A | 340MB | 12MS | 3.5X1" | IDE | 245 |
| LPS540A | 540MB | 12MS | 3.5X1" | IDE | 325 |
| LPS270S | 270MB | 12MS | 3.5X1" | SCSI | 235 |
| LPS340S | 340MB | 12MS | 3.5X1" | SCSI | 265 |
| LPS540S | 540MB | 12MS | 3.5X1" | SCSI-2 | 355 |
| P1080S | 1.0GB | 9.5MS | 3.5X1" | SCSI-2 | 675 |
| P1440S | 1.4GB | 9.5MS | 3.5" | SCSI-2 | 885 |
| P2160S | 2.1GB | 9.5MS | 3.5" | SCSI-2 | 1195 |

## digital

**FACTORY NEW- 2 FULL WARRANTY**
**DISK DRIVES FOR POWER USERS**

| | | | | | |
|---|---|---|---|---|---|
| DSP3107 | 1.0BG | 9.5MS | 3.5" | SCSI-II | $690 |
| DSP3210 | 2.1GB | 9.5MS | 3.5" | SCSI-II | 1200 |
| DSP5300 | 3.5GB | 12MS | 5.25" | SCSI-II | 1800 |
| DSP5350 | 3.5GB | 12MS | 5.25" | SCSI-II | 2200 |

## IBM PS1 PS2

**PS/2 50, 50Z, 60, 70, 80, P70**

| | | | |
|---|---|---|---|
| 125MB | 15MS | IDE | $349 |
| 200MB | 15MS | IDE | 399 |
| 420MB | 13MS | IDE | 499 |
| 540MB | 12MS | IDE | 599 |
| 540MB | 12MS | SCSI | 599 |
| 1.2GB | 12MS | SCSI | 899 |

**MICROCHANNEL CONTROLLER**

| | | | |
|---|---|---|---|
| IDE | 169 | SCSI-2 | $179 |

**IBM PS/1 & PS/2 INTERNAL DRIVE KITS**

| | PS/1 386 & 486 | PS/2 25, 30, 30-286 |
|---|---|---|
| 210MB | $299 | $299 |
| 420MB | 399 | 399 |
| 540MB | 499 | 499 |
| 1.0GB | 799 | 799 |

## IBM

| | | | |
|---|---|---|---|
| 364MB | 12MS | SCSI | $235 |
| 527MB | 12MS | SCSI | 339 |
| 728MB | 12MS | SCSI | 449 |
| 1052MB | 8.6MS | SCSI | 669 |
| 2040MB | 9.2MS | SCSI | 1199 |
| 4250MB | 11MS | SCSI | 2239 |
| 270MB | 12MS | IDE | 209 |
| 364MB | 12MS | IDE | 220 |
| 527MB | 12MS | IDE | 314 |
| 728MB | 12MS | IDE | 399 |
| 1052MB | 8.6MS | IDE | 675 |

## HEWLETT PACKARD

**FACTORY NEW- 5 YEAR WARRANTY**

| | | | | |
|---|---|---|---|---|
| 1.0GB | 10MS | 3.5" | SCSI | $749 |
| 2.1GB | 8.9MS | 3.5" | SCSI | 1350 |

## Maxtor

**FACTORY NEW- 2 YEAR WARRANTY**

| | | | | | |
|---|---|---|---|---|---|
| 7170 | 170MB | 15MS | 3.5"X1" | IDE | $195 |
| 7290S | 290MB | 14MS | 3.5"X1" | SCSI | 217 |
| 7345S | 345MB | 14MS | 3.5"X1" | SCSI | 236 |
| 7345 | 345MB | 14MS | 3.5"X1" | IDE | 207 |
| 7546A | 540MB | 12MS | 3.5"X1" | IDE | 299 |
| DR3406 | 345MB | MOBILE MAX | | IDE HHH | 250 |
| DR3408 | 540MB | MOBILE MAX | | IDE HHH | 360 |
| DR3410 | 105MB | MOBILE MAX | | PCMCIA | 360 |

## FUJITSU

**FACTORY NEW- 5 YEAR WARRANTY**

| | | | | | |
|---|---|---|---|---|---|
| M2684 | 530MB | 13MS | 3.5" | IDE | CALL |
| M2694ESA | 1.2GB | 10MS | 3.5" | SCSI | $665 |
| M2691 | 560MB | 8.5MS | 3.5" | SCSI | CALL |
| M2903 | 2.1BG | 10.5MS | 3.5" | SCSI | CALL |
| M2915 | 2.1GB | 9MS | 3.5" | SCSI | CALL |
| M2909 | 3.1GB | 10.5MS | 3.5 | SCSI | CALL |

## NOTEBOOK HARD DRIVES

### TOSHIBA

**NOTEBOOK DRIVES/**
**1 YEAR WARRANTY ON 2.5"**

| | | | | | |
|---|---|---|---|---|---|
| MK1522FC | 126MB | 15MS | 2.5" | IDE | $275 |
| MK2224FC | 213MB | 15MS | 2.5" | IDE | 375 |
| HDDNB258 | 258MB | 15MS | 2.5" | IDE | 419 |
| MK2326FC | 340MB | 15MS | 2.5" | IDE | 549 |
| MK2428FC | 524MB | 15MS | 2.5" | IDE | 775 |

### IBM

| | | | |
|---|---|---|---|
| IBMHDN250 | 250MB | IDE | $419 |
| IBMHDN340 | 340MB | IDE | 549 |
| IBMHDN520 | 520MB | IDE | 775 |

### Seagate

| | | | |
|---|---|---|---|
| ST9145AG | 128MB | 16MS | $275 |
| ST9150AG | 128MB | 16MS | CALL |
| ST9235AG | 210MB | 16MS | 375 |
| ST9385AG | 340MB | 16MS | 555 |
| ST9550AG | 455MB | 16MS | CALL |
| ST9655AG | 524MB | 16MS | CALL |

### Quantum™

| | | | | |
|---|---|---|---|---|
| GLS256AT | 256MB | 16MS | | $345 |
| GLS256S | 256MB | 16MS | | 349 |

## WIDE SCSI

### IBM

| | | | | |
|---|---|---|---|---|
| 0662S12W | 1.05GB | 8.6MS | LP3.5 | $789 |
| 0664W | 2.04GB | 9MS | 3.5 | 1439 |
| 0664ESH | 4.25GB | 11MS | FH | 2699 |

### Seagate

| | | | | |
|---|---|---|---|---|
| ST12550W | 2.13GB | 8MS | 3.5" | $1529 |
| ST15150W | 4.29GB | 8MS | 3.5" | NEW! |

## SCSI ACCESSORIES

**HARD DRIVE EXTERNAL CABLES**

| | |
|---|---|
| CENTRONICS 50 TO SCSI-II | $50 |
| CENTRONICS 50 TO MAC 25-PIN | 18 |
| CENTRONICS 50 TO CENTRONICS | 23 |
| CENTRONICS 50 TO CENTRONICS 50 6FT | 23 |
| CENTRONICS 50 TO CENTRONICS 50 3FT | 20 |
| CENTRONICS TO DB-50 | 50 |
| DB-50 TO SCSI-II | 50 |
| DB-50 TO DB-50 | 50 |
| SCSI-II TO SCSI-II | 50 |
| FAST WIDE SCSI-II TO CENTRONICS | 100 |

**HARD DRIVE INTERNAL CABLES**

| | |
|---|---|
| SCSI 50-PIN RIBBON 3 CONNS. 2 DEVICE | 11 |
| SCSI 50-PIN RIBBON 4 CONNS. 3 DEVICE | 15 |
| SCSI 50-PIN RIBBON 5 CONNS. 4 DEVICE | 18 |
| SCSI 50-PIN RIBBON 8 CONNS. 7 DEVICE | 28 |
| IDE 40-PIN RIBBON 3 CONNS. | 9 |
| FLOPPY & IDE CABLES SET | 11 |

## SCSI-IDE CONTROLLERS

### adaptec

| | | |
|---|---|---|
| 1505 | CD ROM 16-Bit SCSI Card Kit | $75 |
| 1515 | 16 BitISA-SCSI 2 KIT | 99 |
| 1522 | 16 Bit 7HD/2FD Ki | 145 |
| 1542CF | Bus Master Complete Kit | 249 |
| 1542C+ | Bus Mstr. Compl. Kit w/Corel SCSI | 314 |
| 1570 | ISA-SCSI AUDIO KIT | 299 |
| 2940 | PCI-FAST SCSI KIT | 299 |
| 2742 | EISA KIT, 14HDs | 365 |
| 2742W | FAST WIDE SCSI CARD | 365 |
| 2842-VL | Fast SCSI-II VESA | 239 |
| APA-460 | Slim SCSI PCMCIA SCCSI Card | 289 |

### Q logic

| | | |
|---|---|---|
| | Fast! SCSI EISA | $209 |
| | Fast SCSI ISA | 149 |
| | Fast SCSI VESA Local Bus | 199 |
| | Fast SCSI PCI | 199 |

### BusLogic

| | | |
|---|---|---|
| KT445S | VESA Local Bus Kit | $299 |
| KT545KT | BusMaster Fast Scsi | 229 |
| KTB7447AK | EISA Fast SCSI Kit | 379 |
| KT757 | DEISAWIDE SCSI DIFFERTN | 585 |
| KT757 | SEISAWIDE SCSI (SINGLE S) | 375 |
| KT946CPCI | Fast SCSI | 269 |

### TRANTOR

| | | |
|---|---|---|
| T130 | 8-Bit W/SCSI WORKS | $65 |
| T348 | Parallel Port to SCSI Plus | 149 |
| T358 | Parallel Port to SCSI Plus Enhnc | 199 |

### Acculogic

20 PCI SCSI Host Adpt.r, Sup. Wide SCSI-3 . $235

### FUTURE DOMAIN

| | |
|---|---|
| TMC-1660SVP SCSI-2 w/Cable & Drivers | $108 |
| TMC-1680SVP SCSI-2/FDD Cable/Drivers | 124 |
| TMC-7000EX SVP Fast SCSI-2 EISA | 389 |

### DTC

| | |
|---|---|
| 2278VL IDE/FDD/1P/1S/1G | $29 |
| 2277VL VL-Bus Caching IDE (Up to 16 MB) | 135 |
| 2130PC PCI/IDE | 45 |
| 2280 IDE/FD/1 P/2S/1 G | 19 |
| 2290 EISA IDE 32-Bit | 117 |
| 3270VL SCSI-2 VL-BUS FDD/HDD | 105 |
| 3280AS SCSI-2/4-FDD | 99 |
| 3290AS EISA SCSI-2/4-FDD | 389 |
| 6282-24 ESDI 24MBPS | 119 |
| CD-ROM Kit SCSI-28 Bit | 47 |

### Addonics

| | |
|---|---|
| MIO400 IDE/FDD/1P/2S 1G IO | $28 |
| MIOVLB07 VL-BUS IDE/FDD/1P/2S/1G | 28 |
| MIOVLB05 VL-BUS Multi I/O w/16550 UART | 39 |
| MIOVLB06 VL-BUS Multi I/O w/SCSI-2 | 95 |

## STANDARD IDE CONTROLLERS

| | |
|---|---|
| 200 2HD/2FD CONTROLLER W/CABLES | $15 |
| 211 2HD/2FD W/2 SERIAL/1 PART/1 GAME | 25 |
| WONDER 2-16550 2HD/2FD 1PARL/1 GAME | 75 |
| HI PERF VLB/ISA I/O W/16550 2FD/2HD | 80 |

## TAPE BACKUPS

### COLORADO MEMORY SYSTEMS

| | |
|---|---|
| 250MB COJUMBO 250 | $165 |
| Trakker 250MB COJT20 | 323 |
| 2120 CARTS SNG/5PK | 19/89 |
| 2120 CARTS Q80 SNG/5PK | 21/99 |

### CONNER®

| | |
|---|---|
| TapeStor 250MB Internal A250 | $149 |
| TapeStor 250MB Ext. Par. A250ep | 339 |
| C2150S 250MB DC6000, 6MB/MIN, BARE INT/EXT | 339/439 |
| C2525S 525MB DC6000, 14MB/MIN, BARE INT/EXT | 469/569 |
| C4320 2GB DAT, 11MB/MIN, BARE INT/EXT | 799/899 |
| C4340 4-8GB TURBO DAT, 88MB/MIN, BARE INT/EXT | 999/1,099 |

### EXABYTE®

| | |
|---|---|
| FS1G 1.5GB TAPE INT/EXT | $795/$949 |
| 4200 2GB TAPE INT/EXT | 849/959 |
| 4200C 4GB TAPE INT/EXT | 949/1,039 |
| 8205 2.5GB TAPE INT/EXT | 1,399/1,649 |
| 8200 2.5GB TAPE INT/EXT | 1,499/1,799 |
| 8505 5GB TAPE INT/EXT | 2,089/2,559 |
| 8500 10GB TAPE INT/EXT | 2,399/2,649 |
| AUTOCHANGER 48GB TAPE EXT | 5,595 |
| 5 PACK TAPES FOR FS1G | 199 |
| 5 PACK TAPES FOR FS10G | 89 |

### OMEGA

| | |
|---|---|
| Iomega Tape250 Internal Basic | $169 |
| Iomega Tape250 Insider Half-height | 189 |
| BERNOUILLI 5.25" 90MB CART. GOLD | 99 |
| BERNOUILLI POWERED 90 DR. W/CART. | 345 |
| BERNOUILLI POWERED MULTIDISK 150 DR. | 485 |

### HEWLETT PACKARD

| | |
|---|---|
| 35470A 2.0GB TAPE INT/EXT | $869/$975 |
| 35480A 4-8GB TAPE INT/EXT | 999/1,075 |
| C1533A 4-16GB TAPE INT/EXT | 1,299/1,399 |
| 4MM 90MM DAT CART (1/5 PK) | 18/$86 |
| 3.5"-5.25" CONVERSION KIT | 39 |

### WangDAT.

| | |
|---|---|
| Parallel Port TACO | $319 |
| 3100 2.0GB TAPE TAPE INT/EXT | 999/1,099 |
| 3200 4-8GB TAPE TAPE INT/EXT | 1,099/1,199 |
| 3400DX 4-8GB TAPE TAPE INT/EXT | 1,165/$1,269 |

### MicroSolutions

**BACKPACKS**

| | |
|---|---|
| SPEED PARALLEL PORT CD ROM DRIVE | $339 |
| 250 TAPE DRIVE (Req. min DOS 3.0) Now with Windows Software | 329 |
| DISKETTE DRIVE 1.2, 5.25 (Required min .DOS 2.0) | 155 |
| DISKETTE DRIVE 1.4, 3.5 (Required min. DOS 2.0) | 145 |
| HARD DRIVE 340 (Required min. DOS 3.0) | 419 |
| 2.8 FLOPPY DRIVE | 189 |

## FLOPPY DRIVES

### TEAC

| | |
|---|---|
| 1.44MB | $44 |
| 2.88MMB | 88 |
| 1.2MB | 54 |
| DUAL FLOPPY 1.44 & 1.2 | 109 |

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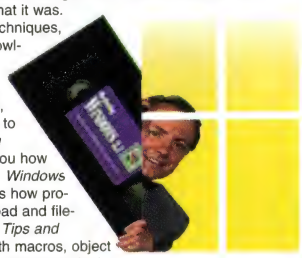

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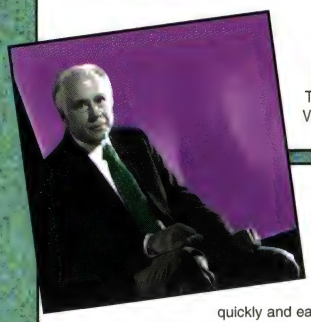

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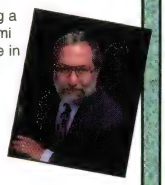

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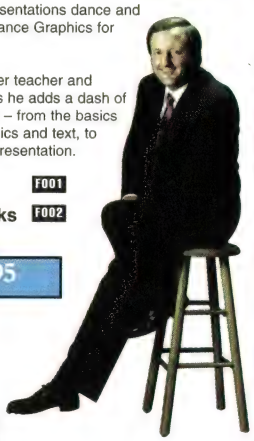

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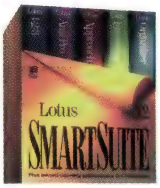

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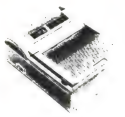

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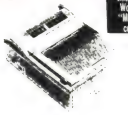

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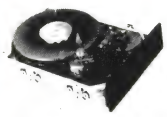

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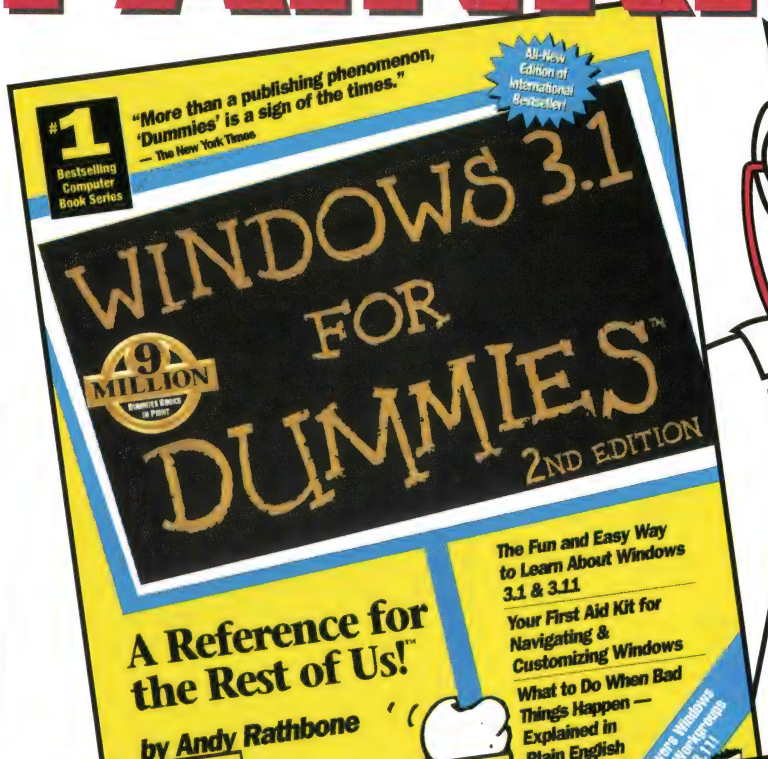

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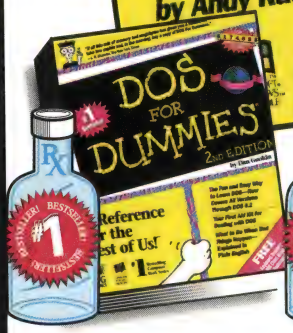


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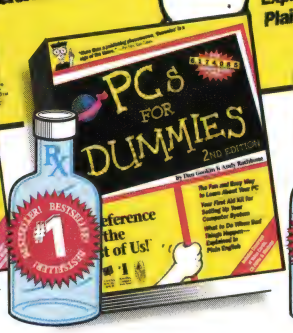


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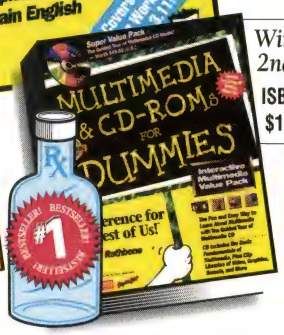


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# Fun With Numbers, Fantasy Castles, and Star Wars Trivia

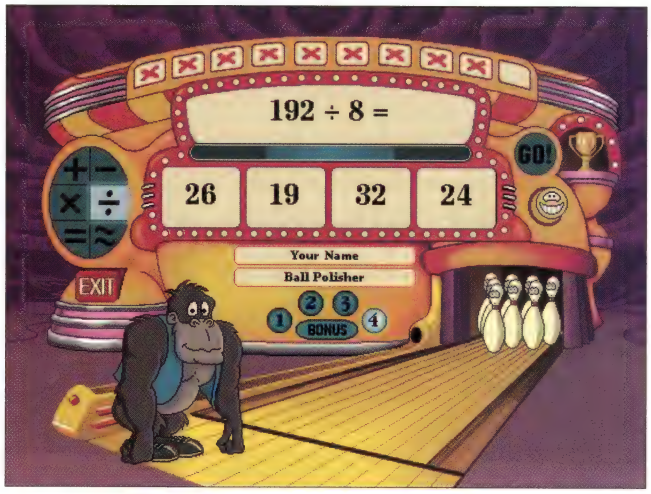
Software for kids is not something I usually write about, but I'm so knocked out by Math Workshop, a charming new CD-ROM from Broderbund, I have to tell you about it. It uses innovative multimedia techniques (like bowling gorillas and boogie-woogie music) to demystify basic arithmetic for children ages 6 to 12—but that's just the beginning. It also uses animation and interactive graphics to teach advanced concepts like fractions, and it even delves into difficult stuff like pattern recognition, spatial visualization, logic, and estimation. All the drills and games reward you with multimedia events—even the Help character (a cute little girl named Poly) is amusing. I bet it will be almost impossible to tear this away from any bright child. One cheer plus one cheer plus one cheer equals...three cheers!

### Castles in the Air

I'm not sure how many "castle freaks" there are in the world, but they will go wild for Castles II: Siege and Conquest. This CD-ROM combines a multimedia seminar on the theory and practice of castle building (borrowed from a BBC documentary) with a battle game that's halfway between SimCity and Battle Chess. The interface is primitive, but the sense of inhabiting medieval France makes the struggle worthwhile.

You start with a video tour of ten of the greatest castles ever built, complete with architectural sketches and helicopter flyovers. A narrator explains the military and tactical trade-offs of various design details.

You can use these classic castle designs for your abode (or create your own) when you start to play the battle-game part of Castles II. Then, using that castle, along with the troops and battle engines you build, you set out on a campaign of conquest through medieval Europe. As in SimCity, however, you will have to take some time out from slaying enemies and stealing horses to establish a thriving economy that can support both military exploits and construction expenses. In fact, you can't even start building your castle until you've gathered wood, mined iron, and recruited military troops.




Get 15 answers right, and the gorilla will bowl a strike for you. But he never does it the same way twice.

Although the video graphics in the documentary section are first-rate, the rest of the game looks far less impressive. Most of the game graphics are semianimated, comic-book–style drawings, and the battles themselves are fought by stick figures. Still, if deciding between a round and a square turret at the southeast corner of your keep makes your heart beat faster, a few stick figures won't spoil the fun.

### Information Please

There are more than 80 million phone numbers in the United States, and up until recently the only way to find one that wasn't already in your Rolodex (or the local phone book) was a series of expensive calls to directory assistance.

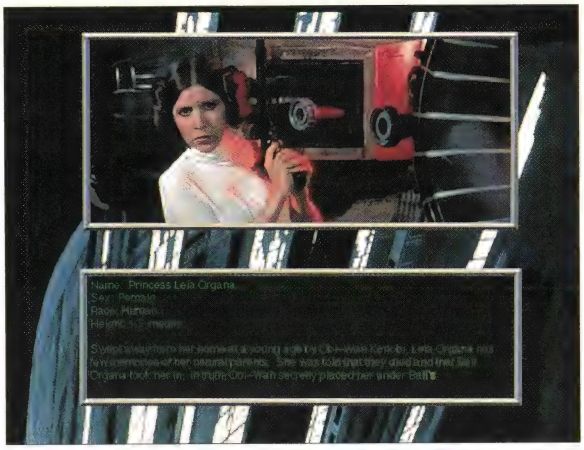
Now, three new CD-ROM business tools—ProPhone for Windows, PhoneDisk PowerFinder, and 70 Million Households Phone Book—are making life on the phone line a whole lot faster.

ProPhone stores 80 million numbers on five CD-ROMs, sorted by region. You use a selection screen to set your search parameters, then the program goes to work. You can call up multiple phone and address listings selected by name, address, area code, ZIP code, or type of business—or any combination thereof. (Searching by anything but name is pretty slow, though.) Click the World icon at the top of the screen, and MapLinx Lite (included at no extra cost) displays a map of the United States showing each highlighted listing. There's even an auto-dialer.

The five CD-ROMs of PhoneDisk PowerFinder hold over 91 million listings. As with ProPhone, you can cull phone numbers by name, address, area code, zip code, or type of business—but because PhoneDisk features an auto-scrolling search function, it's blindingly fast. As you type in letters or numbers, PhoneDisk moves its highlight bar right to the name you need. It took me about three keystrokes (and 10 seconds) to compile a list of every record store in New Orleans—including Eddie's Three-Way (it's also a bar and a shoeshine parlor). Printing and file export options are basic but serviceable. My only complaint is that the spring 1994 edition did not have *me* in it, although I've lived at the same address for several years. PhoneDisk is designed for DOS, but it runs happily in a DOS box under Windows—at a blazing clip, too. It's my favorite of the three, even if it does cost $249.

70 Million Households Phone Book is underpowered. It only takes up two

**By Michael Goodwin**



**MORE THAN JUST A PRETTY SCREEN SAVER, LucasArts' Star Wars Screen Entertainment includes detailed behind-the-scenes filmmaking technia.**

disks and at $69 it's quite affordable. But it lacks some important features: You can't search by area code or type of business, and after you view a phone number your only export option is to print it—one number per page. You have to guess which states are on which disk, too. I wasted five minutes searching in vain for Louisiana numbers on the "East" disk; 70 Million Households thinks Louisiana is in the West.

### Star Wars Technia and Trivia

At first glance, LucasArts' Star Wars Screen Entertainment looks like a cynical attempt to wring one last quart of Grade A from Lucas's main cash cow. But this inexpensive, disk-based divertissement (it's only $35.95) is a revealing compendium of behind-the-scenes technia and trivia, and will probably be of keen interest to filmmaking fanatics as well as R2D2 diehards.

Among many other things, Star Wars Screen Entertainment is an After Dark–compatible screen saver. But it's also a collection that includes working storyboards for all the composited sequences, an encyclopedia of trivia, full spaceship schematics, Star Wars posters, and a copy of the complete screenplay. You better love Star Wars a lot, because if you load all 14 modules you'll need 9MB of hard disk space.

- **70 Million Households Phone Book** $69; American Business Information; 402/593-4595
  **Reader service no. 737**
- **Castles II: Siege and Conquest** $59.95; Interplay; 800/969-4263
  **Reader service no. 631**
- **Math Workshop** $49.95; Broderbund; 800/521-5263
  **Reader service no. 632**
- **PhoneDisk PowerFinder** $249; Digital Directory Assistance; 800/284-8353
  **Reader service no. 738**
- **ProPhone For Windows** $199; Pro CD; 617/631-9200
  **Reader service no. 739**
- **Star Wars Screen Entertainment** $35.95; LucasArts Entertainment; 800/782-7927
  **Reader service no. 634**

*Michael Goodwin is a contributing editor for* PC World. *He can be reached on PC World Online (see page 12 for contact information).* ■

# COMING UP

## Smart Windows Speedup Tips

Sick of slogging away at your Windows PC? Afraid that you'll need to junk your system and buy something new and expensive? Is there a cheaper way to speed up your system? Our terrific Windows speedup tips will help you get the most from your machine—for little or no cost at all!

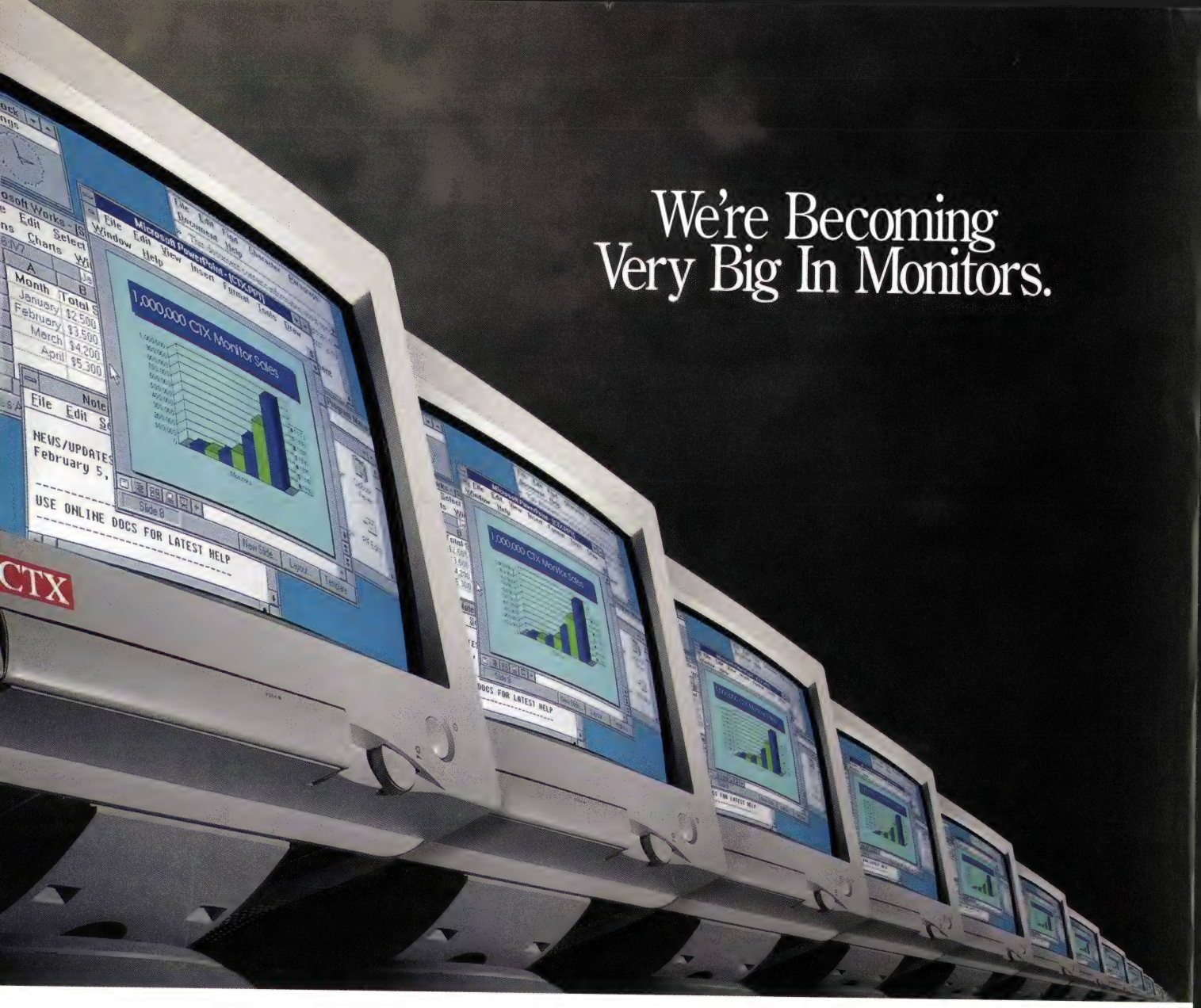
## Take the Multimedia Plunge

Now that multimedia is a reality, it's a great time to buy. Price and technology barriers are dropping, but how do you separate the best from the rest? Our review of 13 CD-ROM drives and 14 sound cards gives you expert advice on selecting the best multimedia hardware.

## Also Next Month:

- **Top 20 Budget, Power, and Mobile PCs**
- **CD-ROMs Galore: Best Titles of 1994**
- **Mixing PCs, Macs, and UNIX: Solving Technology and Culture Clash in the Multiplatform Office.**
- **Tips on using WinWord 6's AutoCorrect feature, managing a shared phone and fax line, and more!**

**PC WORLD**

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**Circle 74 on reader service card**

# Seeing Is Believing: Vital Video

There's a computing truism: Replace one component, and something else will need to be upgraded. Sure enough, after I bought my new Sony 17-inch monitor (see last month's *Home Office*), my old video card's performance felt sluggish, and its colors looked dull. The only solution was to replace it. Oh well, a card is a lot cheaper than a monitor.

To tell the truth, I've always been intimidated by video cards, with their dazzling array of specs and assorted drivers. Well listen, they're not that bad, and I found three excellent cards—from Diamond Computer Systems, ATI, and Boca Research—in three very different price ranges. *PC World*'s regular "Top 10 Windows Accelerators" feature and a straw poll of the Pasadena IBM Users Group confirmed my conclusions. All of these cards, by the way, can use the VESA local bus.

The most spectacular card I tried was Diamond's Stealth 64, a 64-bit heavyweight with 4MB of fast but expensive VRAM and a maximum refresh rate of 120 Hz. It sells on the street for about $500, although the 2MB version goes for under $350. It's a big chunk of change, but when I flipped the computer's switch and saw Windows pop onto the screen, I thought I had a double Pentium. Windows applications appeared instantly, and I could jump between programs in what felt like half a nanosecond. And the colors—all 16.8 million of them—were rich and vibrant.

Installing the Stealth 64 was easy: It has no switches to set, and everything's software driven. In Windows, I used Diamond's InControl Tools to configure the Sony monitor and to center the image. The monitor is Energy Star compliant, so I set up Diamond's DPMS power management tools so they would power the monitor down after 30 minutes of inactivity. • *Stealth 64; Diamond Multimedia Systems; 408/736-2000, 408/730-5750 (fax). Reader service no. 671*

### Cheaper Color

While I loved the Stealth 64, I couldn't honestly justify the cost. If I was doing a lot of high-end graphics work at a very high resolution with 16.8 million colors, the Stealth 64 would be well worth the price. But I'm a 1024-by-768-by-256-colors kind of guy. So I looked at some cheaper boards that could still give me acceptable performance.

With a street price of about $240, ATI's Graphics Xpression gives the Stealth 64 a run for its money. For my daily work, the ATI's 64-bit engine and 2MB of DRAM make it seem every bit as fast as the Stealth. True, the ATI can't give me the Stealth's 16.8 million colors at a resolution higher than 800 by 600, but I can live with that. • *Graphics Xpression; ATI; 905/882-2600, 905/882-2620 (fax). Reader service no. 666*

My biggest surprise was Boca Research's Voyager, a 1MB DRAM board with a 32-bit engine. Don't let the unimpressive specs worry you: At 1024 by 768 and 256 colors, the board's still fast enough for me—thanks to Boca's video caching techniques. At about $145 discounted, it's dirt cheap, but it packs a lot of value and performance. • *Voyager; Boca Research; 407/997-6227, 407/997-0918 (fax). Reader service no. 674*

My recommendation? If your graphics demands are high, make the commitment and buy a 2MB Diamond Stealth, upgrading to 4MB only if you really need to. Otherwise, try ATI's Graphics Xpression or Boca's bargain-basement Voyager.

### Quick Switches

You can still make any card jump through hoops with the right software. I've been working with a prerelease

copy of Binar's AnyView Professional, and I'm impressed. Imagine using WinWord with 640 by 480 by 256 colors, then switching to CorelDraw and watching your computer change automatically to true-color 1280 by 1024. AnyView changes resolutions and color depths on the fly, and it lets you assign them to applications for automatic switching. Plus there's all sorts of speed and memory stuff that I don't have room to talk about here. You never really know how a program will work until you get a shipping copy, but judging from my beta version, this is a pretty amazing product. • *AnyView Professional $99.95; Binar Graphics; 800/228-0666, 415/491-4182, 415/491-1164 (fax). Reader service no. 711*

For a real bargain, try VidSwitch, a clever $10 shareware mode changer. VidSwitch lists your video modes, lets you switch easily from one to another, and then restarts Windows for you. It's available on PC World Online and other services as VSW14C.ZIP. • *Graphic Impact; 805/378-7232, 805/482-6213 (fax). Reader service no. 712*

*Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).*

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**By Steve Bass**

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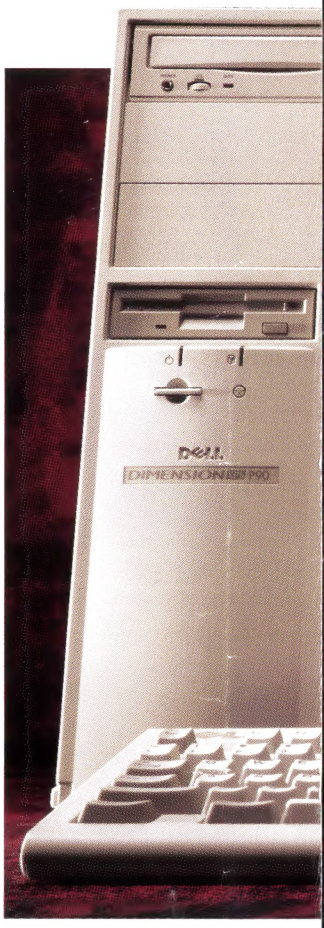


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intel inside

*‡Performance measured by running WinBench 4.0 and Torque 1.0 at 1024x768, 8-bit, 16-bit, and 32-bit per pixel modes. Performance compared to: Diamond Stealth 64 (4MB VRAM), ATI Ma memory, and Smartdrv=2048.* ****Guarantees available in the USA only for registered owners of Dell Dimension Systems purchased after 8/1/93. For a complete copy, please call our Guarantees.*** *◊Business leasing arranged by Leasing Group, Inc. *Prices valid in the U.S. only. Some products and promotions available in the U.S. only. Prices and specifications subject to chang Intel Inside logo are registered trademarks and Pentium and IntelDX2 are trademarks of Intel Corporation. MS-DOS, MS and Microsoft are registered trademarks and Windows is a trademark of Mic Magazine Corp. Dell disclaims proprietary interest in the marks and names of others.* *©1994 Dell Computer Corporation. All rights reserved.*

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*ch 64 Pro Turbo (2MB VRAM). Testing with Imagine performed by #9 Computer Corp. on Dell Dimension XPS P90 system, 256k cache, 16MB* ***TechFax℠ line at 1-800-950-1329, or write Dell USA L.P., 9505 Arboretum Blvd., Austin, TX 78759-7299. Attention Dimension*** *e without notice. ΔOn-site service provided by BancTec Service Corp. On-site service may not be available in certain remote locations. Intel and the rosoft Corporation. Peavey is a registered trademark of Peavey Electronics Corporation. FORTUNE 500 is a registered trademark of The Time Inc.*

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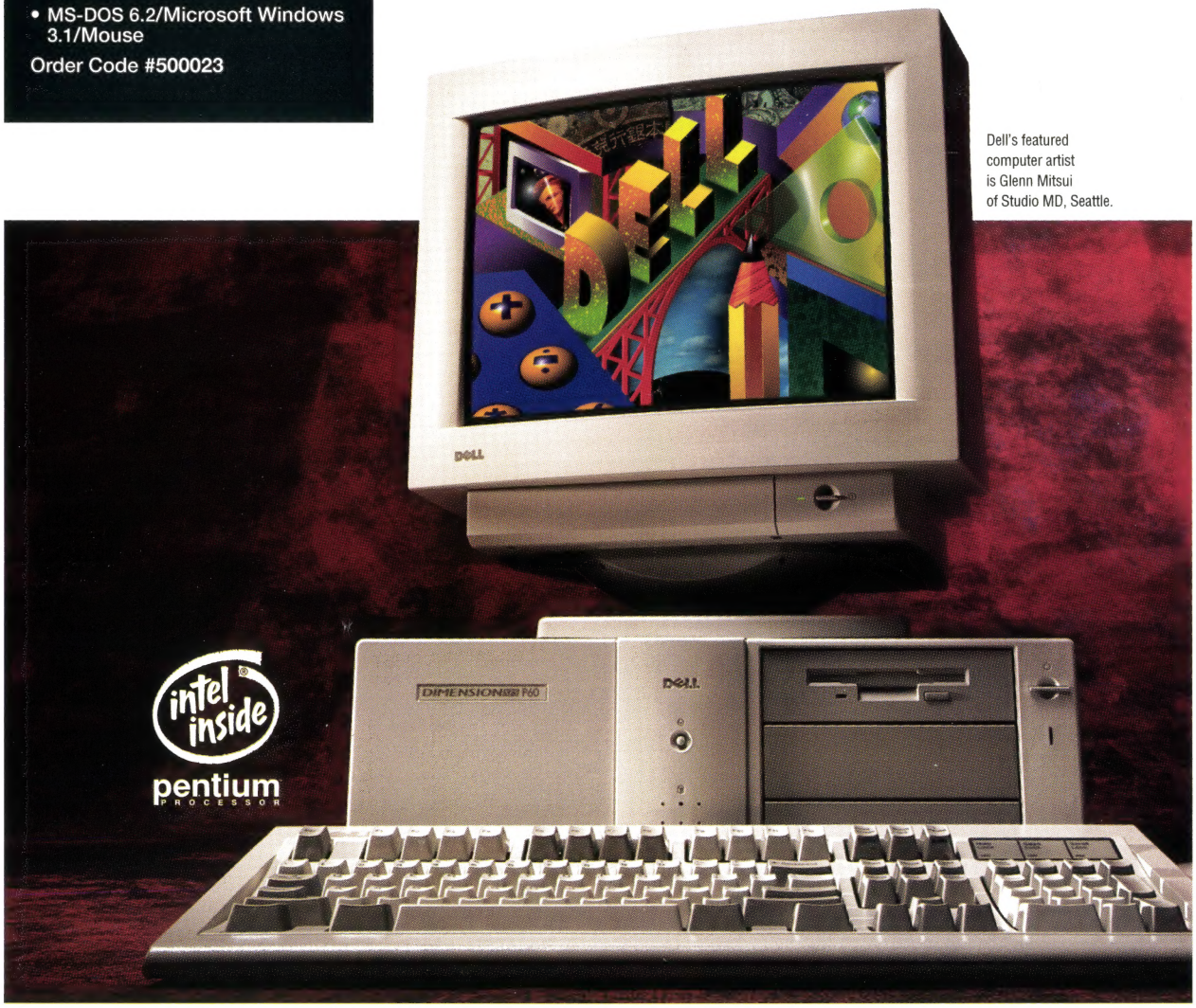


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